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PART VII

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

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SQUID FISHERIES OF THE NORTHWESTERN ATLANTIC

Preliminary Fishery Management Plans

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On the 4th of February 1977, the Secretary of Commerce, through an appropriate delegation of authority to the Associate Administrator for Marine Resources of the National Oceanic and Atmospheric Administration and the Director of the National Marine Fisheries Service, published a Notice of Determination, Preparation, Issuance, and Implementation of Preliminary Fishery Management Plans at 42 FR 6873. In order that each Plan may have the widest possible circulation, the Secretary has decided that each should be published in the FEDERAL REGISTER.

Dated the 8th day of February 1977 at Washington, D.C.

WINFRED H. MEIBOHM,
Associate Director, National Marine Fisheries Services.

TABLE OF CONTENTS

I. INTRODUCTION 1

II. Preliminary Description of Fishery

a. Areas and Stocks Involved
b. Statistical History of Exploitation
c. Significance of Historic Domestic Fishery
d. Types and Numbers of Vessels Employed

(1) Domestic
(2) Foreign (part of)

e. Types and Numbers of Fishing Gear Employed

f. Historical Impacts of Foreign Fishing on Domestic Fishery (by Country)

(1) Competition for Available Stocks
(2) Gear Conflicts
(3) Nontarget Species Mortalities
(4) Economic Interactions

g. History of Regulation of Foreign Fisheries (Including Violations)

h. History of Cooperative Research, Conservation, Management and Data Exchange

III. Status of the Fishery Stock(s)

a. Distribution of Exploited Stocks
b. Abundance of Exploited Stocks

(1) Equilibrium Yield Curves
(2) Yield per Recruit
(3) Cohort Analysis
(4) Stock Recruitment Relationships

c. Current Fishing Status (including by-catch)

IV. Optimality

a. Relevant Socioeconomic Factors
b. Optimum Yield - Derivation and Description (Preliminary Determination)
c. Estimated Domestic Production Potential
d. Suggested Total Allowable Level of Foreign Fishing (All Countries)

V. Conservation and Management Measures Applicable to Foreign Fisheries

a. Data to be Reported by Foreign Fishery

b. Zones and/or Periods of Limited Foreign Fishing

c. Catch Limitations

d. Other Limitations, Conditions, or Requirements

e. Coastal State Fishery Conservation and Management Measures Recommended for Incorporation Into This Plan

f. Other Measures

g. Relationship of Conservation and Management Measures to Conservation Needs

h. Relationship of Conservation and Management Measures to National Standards

i. Approximate Costs of Conservation and Management Measures N/A

VII. References to Relevant Background Documents. The advance notice of proposed regulations will be appended.

I Introduction

Harvesting of short-finned squid (illex) and long-finned squid (loligo) off the Northeastern United States was, until January 1, 1977, regulated under terms of the International Convention for the Northwest Atlantic Fisheries (ICNAF) and subsequent agreements between the 18 signatory nations. The Fishery Conservation and Management Act of 1976 (P.L. 94-265), enacted and signed into law on April 13, 1976, established an extended jurisdiction fishing zone and exclusive US regulation of this zone under the concept of optimum yield. In the future, management plans for offshore New England waters will be formulated by the New England Fisheries Council, a regulatory body formed by P.L. 94-265. However, the Secretary of Commerce, in order to comply with other areas of P.L. 94-265 must have Preliminary Management Plans (PMP) in place by March 1, 1977 to permit foreign nationals to fish in the fisheries conservation zone, provided that no fishery management plan will be prepared by the New England Regional Fishery Management Council prior to March 1, 1977.

II Preliminary Description of Fishery

a. Areas and Stocks Involved.

The Commercial fishery for squid in ICNAF SA 5 and 6 is based on two species, the short-finned or summer squid (Illex illecebrosus), and the long-finned or winter squid (Loligo pealei). The former is found between Greenland and Florida, is most abundant in the Newfoundland region, and is moderately abundant between Newfoundland and New Jersey (Mercer 1965). There is a northerly migrating component which is found in SA 3 and 4 during the warm months which moves south to overwinter, possibly as far south as SA 5 and 6 (ICNAF 1975). It is found in SA 5 and 6 throughout the year, but more predominantly in the warm months (Tibbetts 1975), suggesting that part of the overall stock(s) is residual to SA 5 and 6. Illex migrates to inshore waters in the spring and summer, but moves offshore in late autumn to overwinter (Tibbetts 1975).

Little is known concerning stock structure or relationships among possible stocks throughout the range. Consequently, the approach chosen by ICNAF in 1975 was to assess Illex as a single stock complex in SA 3-6, although separate OY's are imposed for SA 3 and 4 and for SA 5 and 6 to reduce the possibility of over-exploitation until stock boundaries can be determined with greater accuracy.

Long-finned squid are found primarily from Cape Hatteras to Corsair Canyon on Georges Bank (Tibbetts 1975) They migrate inshore and are found in harbors and estuaries (particularly in New England), in spring and summer and move offshore again in autumn, where they overwinter at the edge of the continental shelf. This species is considered to constitute a unit stock in SA 5 and 6. There does not appear to be any commercially significant occurrence of this species north or south of the region.

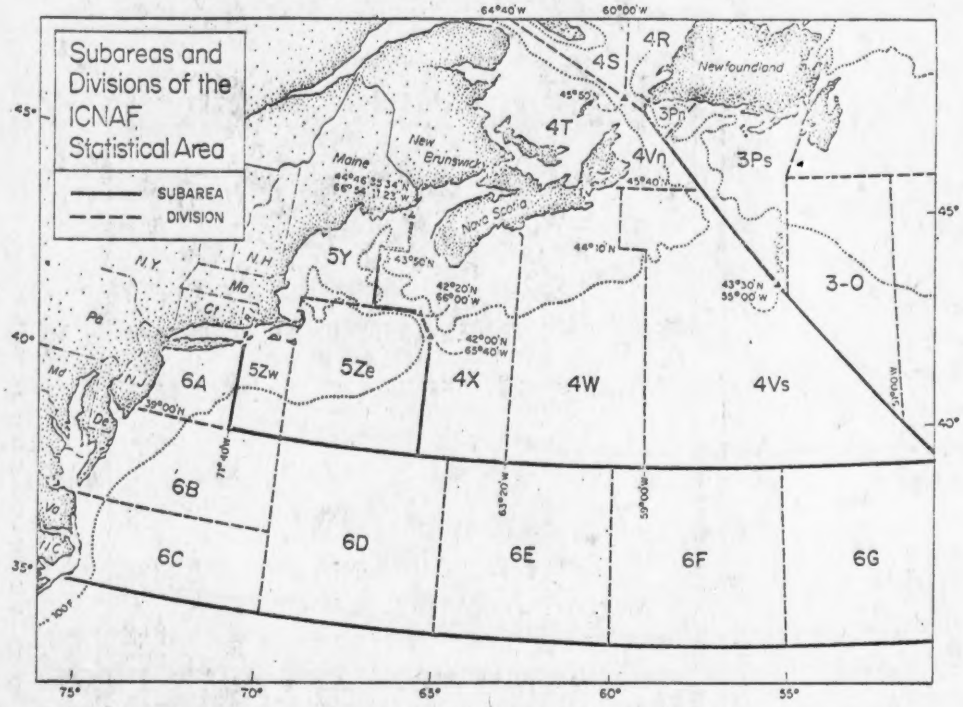


Figure 1. Northwest Atlantic from Cape Hatteras to Newfoundland, showing ICNAF Areas referred to in the Management Plan.

b. Statistical History of Exploitation

United States fishermen have landed squid at least since the late 1800's (Lyles 1968). Since 1928, landings have remained fairly constant at an annual average of about 1800 metric tons (Table 1), indicating stable market conditions. The relative proportions of the total landings contributed by Loligo and Illex are unknown as until recently no distinction was made between the two; however, species distributions indicate that Loligo has contributed the major portion of the USA catch, especially south of Cape Cod.

The distant-water fishing for squid in SA 5 and 6 was initiated in 1964 with a small incidental catch by the Union of Soviet Socialist Republics (USSR). Distant-water fleet catches remained low until 1967 and have since risen dramatically as a result of increased fishing effort and increased abundance while the USA catch has remained constant. Landings by all nations peaked at 56,800 tons[1] in 1973 and have since declined (Table 2). Estimated landings of Loligo rose from 1,700 tons in 1967 to 42,900 tons in 1973. Japan, Spain, and the USSR have taken the bulk of the catch in recent years (averaging 13,400, 7,000 and 3,600 tons, respectively, since 1970) (Table 11). Bulgaria, France, the Federal Republic of Germany (FRG), Italy, Poland, Romania, the German Democratic Republic (GDR), Cuba, and the USA have landed smaller amounts. Estimated Illex landings rose from 1,000 tons in 1967 to 20,500 tons in 1974. Japan, Spain, Poland, and the USSR appear to have accounted for most of the landings in recent years (averaging 2,300, 4,000, 3,700, and 3,600 tons, respectively, since 1972)(Table 3). Smaller amounts have also been landed by Canada, Bulgaria, the FRG, Italy, Romania, USA, GDR, and Cuba.

[1]Tons in this Plan refers to metric tons.

Table 1. United States historical squid landings[a] for the New England and mid-Atlantic areas in metric tons, 1928-1963.

Year	Area		Total
	New England	Middle Atlantic	
1928	3,596	(b)	3,596
1929	2,561	409	2,970
1930	2,497	805	3,302
1931	1,275	995	2,270
1932	1,411	998	2,409
1933	488	359	847
1934	(b)	(b)	(b)
1935	1,607	1,099	2,706
1936	(b)	(b)	(b)
1937	1,495	1,067	2,562
1938	977	928	1,906
1939	1,089	1,497	2,585
1940	795	1,188	1,983
1941	(b)	(b)	(b)
1942	494	327	821
1943	473	494	967
1944	434	407	841
1945	749	563	1,312
1946	476	(b)	476
1947	748	333	1,082
1948	1,168	832	2,000
1949	2,102	950	3,053
1950	636	421	1,057
1951	1,824	676	2,500
1952	369	527	896
1953	2,041	438	2,479
1954	1,194	404	1,598
1955	1,182	629	1,811
1956	865	464	1,329
1957	2,017	641	2,658
1958	1,165	735	1,900
1959	1,069	495	1,564
1960	948	549	1,497
1961	554	801	1,355
1962	1,124	907	2,032
1963	1,217	757	2,105

a - Source: Lyles 1968.
b - Landings not reported.

Table 2. Annual squid landings in metric tons, by country for SA 5 and 6, 1963-1975.

Areas	Year	Canada	Bulgaria	France	Federal Republic of Germany	Japan	Italy	Spain	Poland	Romania	USSR	USA	German Democratic Republic	Total
5 and 6	1963											2,105		2,105
	1964										4	929		933
	1965										176	1,154		1,330
	1966										389	1,173		1,562
	1967					6					833	1,829		2,662
	1968					1,731					3,176	1,762	10	6,679
	1969					7,122					1,340	1,461	1	9,924
	1970					13,639		4,510			655	1,061	20	19,885
	1971	1	90			10,602		4,167			6,138	1,182		22,210
	1972		499	296	463	18,691	3,200	11,859	5,428	67	6,976	1,214	14	48,707
	1973		410	820	1,641	15,526	3,165	14,932	9,199	150	8,977	1,635	313	56,768
	1974	27	592			16,820	4,260	16,144	6,709	9	8,495	2,422		55,528
	1975[a]		198		22	14,327	4,231	8,504	6,836	8	8,001	1,700	898	44,725
5	1963											1,210		1,210
	1964										4	189		193
	1965										176	387		563
	1966										341	193		534
	1967										330	913		1,243
	1968					112					2,415	903	10	3,440
	1969					3,724					1,182	739	1	5,646
	1970					5,363					655	483	20	6,501
	1971	1	80			4,661		256			5,659	711		11,368
	1972		480	6	63	7,862		5,797	5,042	28	6,381	459	14	26,138
	1973		396	403	136	5,811		10,147	9,157	18	8,631	873	313	36,161
	1974	3	196			7,267	1,010	7,448	6,229	2	5,612	1,117		28,884
6	1963											895		895
	1964											740		740
	1965											767		767
	1966										48	980		1,028
	1967					6					503	916		1,425
	1968					1,619					761	859		3,239
	1969					3,398					158	722		4,278
	1970					8,276					-	578		8,854
	1971		10			5,941		3,941			479	471		10,842
	1972		19	290	400	10,829	3,200	6,063	836	39	595	748		22,569
	1973		14	417	1,505	9,715	3,165	4,785	42	132	346	762		20,492
	1974	24	396			9,553	3,250	8,696	480	7	2,883	1,305		26,594

[a]Preliminary figures.

Table 3. Estimated[a] species breakdown of squid landings in ICNAF SA 5 and 6, 1963-1975.

Year	Canada	Bulgaria	France	FRG	Japan	Italy	Spain	Poland	Romania	USSR	USA	GDR	Cuba	Total
							Loligo							
1963											1,294			1,294
1964											572			576
1965										99	709			808
1966										226	722			948
1967					5[b]					548	1,125			1,678
1968					177[b]					2,184	1,083	5		3,449
1969					7,125[b]					1,080	898			9,103
1970					13,557		4,483			482	652	10		36,184
1971		50			10,528		1,881			3,561	727			16,747
1972		254	296	463	17,102	2,928	8,165[b]	2,754	33	4,045	742		7	36,789
1973		410[b]	820	1,639	14,396[b]	2,994	11,145[b]	5,134	139[b]	5,000	1,100	163		42,940
1974		300	27		13,493[b]	3,280[b]	9,375[b]	1,653	-	4,485	2,141	-		34,754
1975	-	74	-		10,746	3,390	8,090	3,785[b]	-	4,295	1,593[b]	620[b]		32,593
							Illex							
1963											810			810
1964											358			358
1965										78	444			522
1966										118	452			570
1967					2[b]					286	704			992
1968					1,655[b]					1,052	678	5		3,390
1969					586[b]					260	562	1		1,409
1970					82		27			174	408	10		701
1971	1	40			48		2,317			2,578	415			5,439
1972		245			1,589	272	3,694[b]	2,674	33	2,927	472		7	11,913
1973		-			1,009[b]	171	3,784[b]	4,070	-	3,976	530	156		13,696
1974		293			3,327[b]	980[b]	6,769[b]	5,052	9	3,945	148			20,523
1975		120	66		3,237[b]	844[b]	1,998	3,051[b]	48	3,706	107[b]	278[b]		13,255

Source:
a - Tibbetts 1976. If not reported by species; the estimate is 60% of the April through September catches of Illex in the offshore fishery of Japan, Spain, Italy, and 50% of the April through September catches of Illex in the shelf fishery of the remaining countries.
b - As reported to ICNAF.

[redacted]c. Significance of Historic Domestic Fishery

The USA squid fishery has traditionally been incidental in nature, the catch being taken primarily in otter trawling directed towards groundfish species. However, squid have also been taken for some time in traps in Massachusetts waters. In 1974 and 1975, some 35-40 small and medium otter trawlers from Massachusetts ports conducted a short-term directed fishery for Loligo on spring spawning concentrations near Nantucket. Catches were processed for export. Loligo has comprised 86% of the USA squid catch in recent years.

Most recent developments in this fishery are best illustrated by landings in Massachusetts and Rhode Island, which account for 95% of the total squid landings in New England (Table [redacted]). In general, prices were substantially higher in Rhode Island and compared somewhat favorably with groundfish prices from 1971-1974, although historical prices for squid have been substantially less than for finfish. Squid have been utilized both for food and for bait in recent years. It is likely that some of the squid used for bait does not enter the recorded statistics. The total value of the New England squid catch by year is given in Table [redacted].

Table 4. Landings, value, and ex-vessel price data for the USA (Massachusetts and Rhode Island) squid fishery, 1971-1974.

Year	Massachusetts Quantity (1,000 lbs)	Massachusetts Value ($1,000)	Massachusetts Ex-vessel price/lb (¢)	Rhode Island Quantity (1,000 lbs)	Rhode Island Value ($1,000)	Rhode Island Ex-vessel price/lb (¢)
1971	979(444)[a]	76	7.8	703(319)	128	18.2
1972	688(312)	85	12.3	750(340)	134	17.9
1973	921(418)	142	15.5	1,621(735)	361	22.3
1974[b]	1,224(555)	221	18.0	784(356)	179	22.8

[a]Volumes in parentheses are in terms of metric tons.
[b]January through August only.

Table 5. Value of New England squid landings.

Year	Value ($1,000)
1964	58
1965	81
1966	54
1967	101
1968	120
1969	202
1970	159
1971	220
1972	220
1973	508
1974	532
1975	354

As indicated by the table, squid have not historically been of great economic significance, but it is clear that the value of the catch has increased considerably in recent years.

There are no published studies on the relationship of the ex-vessel squid price to landings, income, prices of other products, etc. However, a recent unpublished NMFS study estimated that the price of squid is inelastic. Current markets for squid are rather small; consequently, when landings are low, the price is high and when landings increase, the market is saturated.

Table 6 contains data on the value of the squid catch in Massachusetts and Rhode Island as a percentage of the value of the total states' catches. It can be seen from the table that the squid catch in Massachusetts constitutes less than one percent of the total value of the state catch, while in Rhode Island it has constituted from 1-2% of the total.

Table 6. Values of squid catches in comparison to total landed values in Massachusetts and Rhode Island, 1971-1975.

	Massachusetts			Rhode Island		
Year	Total fish and shellfish ($1000)	Squid	%	Total fish and shellfish ($1000)	Squid	%
1971	48,348	76	(1)	12,552	128	1
1972	56,757	85	(1)	12,592	134	1
1973	56,226	143	(1)	14,953	361	2
1974	50,712	241	(1)	15,866	285	2
1975	65,738	19	(1)	18,796	333	2

(1) = less than one percent

The aggregate impact of the 1975 New England catch of squid on the New England region is presented in Table 7. These results indicate that the total New England 1975 squid catch of $354,000 had an aggregate impact on the region of over $1 million. Of this amount, approximately $416,000 constitutes payments to the household sector.

A number of firms in the New England region process at least some squid. Processes of evisceration and skinning are usually done manually.

A very small domestic food market exists, concentrated among a few ethnic groups. However, squid is very popular abroad; the European market for example is estimated to approximate 113,000,000 lbs. The principle product is whole squid (eyes removed). Other potential squid products include breaded rings, chunks, minces and squid fillets and blocks.

Squid are also extensively used as bait in northeastern USA recreational fisheries. However, it appears that although Loligo and Illex are purchased in quantity in a few localities for this purpose, the primary source of bait squid used in the northeast has been the west coast. Consequently, the potential for a much larger bait fishery is obviously on the east coast.

Table ' . Aggregate impact of the 1975 squid catch on the New England region.

Sector	Impact per dollar of output	Aggregate impact
Fish catching	1.00713	$ 356,624
Fish processing	.00039	138
Fish forzen processing	.00002	7
Fish wholesale & jobbing	.00117	414
Ship and boat buidling	.00187	662
Marinas & yards	.05713	20,224
Marine wholesale & retail	.03010	10,655
Marine manufacturing	.01862	6,591
Construction, towing, agent	.10111	35,792
Research and education	.00008	28
Marine military	.00094	333
Charter fishing	.00001	4
Other marine	.00218	772
Other economic activities	.45690	161,742
Households	1.17623	416,385
State and local government	.10696	37,864
TOTAL	2.96081	$ 1,048,134

11 AMV

d. Types and Numbers of Vessels Employed

(1) Domestic - Table 8 contains data on the number of USA vessels which recorded some squid landings in 1965, 1970, and 1975, and those vessels whose squid catch was 50% or more of their total catch. It can be seen that the small number of "directed" squid vessels reflect the generally undeveloped state of the fishery. On the other hand, there is a large and growing number of vessels which recorded some squid landings.

Table ' . Number of vessels in the squid fishery.

Year	Number of vessels landing some squid	Number of vessels whose total catch was 50% or more squid
1965	122	3
1970	152	7
1975	208	3

(2) Foreign Vessels - In 1961, Soviet fleets made their appearance on Georges Bank, 150 mi east of Boston. The number of vessels observed on the grounds at any one time was about 50. However, for the year the Soviet expedition totaled 100 individual vessels. In subsequent years, 300-400 different Soviet vessels fished seasonally on Georges Bank, primarily for herring. By 1965 during peak fishing seasons (summer and fall) 200-250 Soviet vessels were fishing for herring, red and silver hake, haddock, and cod on Georges Bank and in southern New England. During that year more than 450 individual vessels were sighted. Beginning in 1966 and continuing into the early 1970s, Soviet fleets were joined each year by increased numbers of vessels from Poland and Romania, followed closely by East and West Germany and Japan. Other nations

12 AMV

followed to include Bulgaria, Spain, France, Greece, and Italy. Most recently nations such as Cuba, South Korea, and Ireland have been represented. During this period 900-1000 foreign vessels annually fished in international waters off the USA East Coast from the southern tip of Nova Scotia to Cape Hatteras. Depending on the season, fleets of 250 to 300 vessels could be found at one time, whether it be off North Carolina-Virginia in winter or on Georges Bank during the summer.

In most recent years the annual number of foreign vessels has declined from 950 in 1971 to under 800 in 1975 (Table 9). It can reasonably be assumed that foreign fleets have dwindled even more during 1976 in response to greatly reduced fish stocks and increasingly more stringent catch restrictions, such as low quotas, closed areas, etc. Despite these restrictions, at peak seasons (winter and spring), 1975-1976, 200-250 vessels were observed at one time on the fishing grounds. However, during other times of the year activity has been at its lowest level in many years.

It is difficult to make an accurate evaluation of actual numbers and types of vessels involved in the squid fishery, as such evaluations must be based on surveillance data collected for approximate numbers of vessels fishing a variety of species. However, Spain and Japan have fished squid extensively off New England and the mid-Atlantic states in recent years using both stern and side trawlers.

Fishing operations have been conducted chiefly in deeper water along the edge of the continental shelf during cooler months. "Days fished" data as reported to ICNAF for 1974 (Table 10) indicate the relative amount of fishing pressure exerted by foreign nationals (note that these data do not take fishing power into account).

Table 9. Numbers of foreign fishing vessels sighted in SA 5 and 6 by type, 1971-1975[a].

Year	Type vessel	Country								
		USSR	Poland	GDR	FRG	Japan	Spain	Bulgaria	Romania	Italy
1971	Stern	186	40	28	26	17	4	11	8	1
	Side	359	57	24		18	34			1
	Support	105	20	8	7			2		
	Total	650	117	60	33	35	38	13	8	2
1972	Stern	211	50	33	18	19	7	11	7	4
	Side	379	59	26		24	47			1
	Support	90	14	9	4	1		2	1	
	Total	680	123	68	22	44	54	13	8	5
1973	Stern	207	50	32	19	18	36	11	7	14
	Side	234	19	29		22	25/52			2
	Support	67	18	7		1		2	1	
	Total	508	87	68	19	41	113	13	8	16
1974	Stern	218	46	23	17	21	57	13	4	11
	Side	144	14	29		30	28/58			
	Support	81	16	7	4	2		4	2	
	Total	443	76	59	21	53	143	17	6	11
1975	Stern	252	37	22	18	15	38	16	2	8
	Side	145	12	20		6	12/70			
	Support	81	16	5	5	5	-	3		
	Total	478	65	47	23	26	120	19	2	8

[a]In addition, small numbers (<10) of stern trawlers belong to France, Cuba, South Korea, Ireland, and Greece have been observed in SA 5 and 6 in recent years.

Table 10. 1974 days fished as reported to ICNAF.

Country	Cod	Haddock	Redfish	Silver hake	Red hake	Pollock	Flounder	Ground-fish	Herring	Mackerel	Pelagic	Other fish	Squid	Total
Bulgaria				55						712				767
Canada	310	91	13			553		148	0				9	1,124
Denmark														
France	3								65					68
FRG									616					616
Iceland														
Italy[a]													0	
Japan								3	147		362		1,902	2,649
Norway														
Poland	6								1,241	3,500		5	423	5,175
Portugal														
Romania									178	345				523
Spain	419												2,378	2,797
USSR				6,804	2,412		18	304	3,012	4,045		1,317	435	18,347
UK		11												11
USA	5,898	77	770	924	106	1,145	13,365	7,051	222	541	574	1,276	1,805	33,754
GDR	2								936	1,392	8	458		2,797
Other														

[a]No reporting of effort units.

[redacted]e. Types and Numbers of Fishing Gear Employed

In the USA fishery, gear used to harvest squid includes trap nets and otter trawls. Foreign nationals harvest squid with demersal trawling gear (Table 11).

[redacted]f. Historical Impacts of Foreign Fishing on Domestic Fishery

[redacted](1). Competition for Available Stocks

United States and foreign landings data for Loligo and Illex in SA 5 and 6 are given in Tables 12 and 13, respectively. While total USA landings show no trend, USA landings, in terms of percentage of the total, for both species have declined from 100% in 1963, prior to the introduction of the foreign fishery, to 5% and 1% for Loligo and Illex, respectively, in 1975. The foreign fishery on these species has increased rapidly in recent years, primarily as a result of catches by Japan, Spain, the USSR, and Poland.

The problems of by-catch in those fisheries for other species of interest to USA fishermen (e.g., butterfish), present another level of competition for available resources (see II.C.1.f.(3)).

[redacted](2) Gear Conflicts

Previous to 1961; USA fishermen shared the fisheries on Georges Bank only with Canada. In 1961, the USSR arrived with a large fleet of herring drifters that caused numerous complaints from USA fishermen alleging that they were being driven from this historical fishing area on the bank. In 1962, the number of USSR herring drifters increased to approximately 300 individual vessels; these were augmented by a fleet of factory stern trawlers and some medium trawlers, also from the Soviet Union. During this period a number of USA trawlers were fouled by running into set gill net or hauling their trawls through discarded netting, consequently fouling their propellers

Table //. Gear types by fishery as reported to ICNAF, 1974[a]

Country	Cod	Haddock	Redfish	Silver hake	Red hake	Pollock	Flounder	Ground-fish	Herring	Mackerel	Pelagic	Other flounder	Squid
Bulgaria				MT						MT			
Canada	BT/LL	BT	BT			BT		LL	MT/PS				BT
Denmark													
France	BT								BT				
FRG									MT				
Iceland													
Italy													
Japan								BT	BT		BT		BT
Norway													
Poland	BT								BT	BT		BT	BT
Portugal													
Romania									MT	MT			
Spain	PT												BT
USSR				BT/MT	BT/MT		BT	BT/MT	BT/MT/PS	BT/MT		BT/MT	BT
UK		BT											
USA	BT/SS/GN LL/HL/HSC	BT/LL	BT/GN	BT	BT	BT/GN/LL MSC	BT/SS/GN POT	BT/MPT/BS/NS/ SN/LL/TP/MSC	BT/MT/PTM MS/TP	BT/BS/PS BR/HL/TP	BT/BS/PS/GN/ HL/TP/MSC	MT/EG/GN/LL HL/TP/MSC	BT/TP
GDR	BT								BT/MT	BT/MT	BT	BT	BT
Other													

[a]BT = bottom trawl, PT = pair trawl, PS = purse seine, SS = scottish seine, LL = long line, TP = trap, MSC = miscellaneous, MT = midwater trawl, MPT = midwater pair trawl, BS = beach seine, GN = gill net, HL = hand line, POT = pot.

Table 12. USA and foreign landings of Loligo for SA 5 and 6, expressed as relative percentages of the total quantity landed, 1963-1975.

Year	USA landings (metric tons)	Percent of total USA landings	Foreign landings (metric tons)	Percent of total foreign landings	Total landings (metric tons)
1963	1,249	100	0	0	1,249
1964	572	100	4	0	576
1965	709	88	99	12	808
1966	722	76	226	24	948
1967	1,125	67	553	33	1,678
1968	1,083	31	2,366	69	3,449
1969	890	10	8,205	90	9,103
1970	652	2	35,532	98	36,184
1971	727	4	16,020	96	16,747
1972	742	2	36,047	98	36,789
1973	1,100	3	41,840	97	42,940
1974	2,141	6	32,613	94	34,754
1975	1,593	5	31,001	95	32,594

Table 13. USA and foreign landings of Illex squid for SA 5 and 6 expressed as relative percentages of the total quantity landed, 1963-1975.

Year	USA landings (metric tons)	Percent of total USA landings	Foreign Landings (metric tons)	Percent of total foreign landings	Total landings (metric tons)
1963	810	100	0	0	810
1964	358	100	0	0	358
1965	444	85	78	15	522
1966	452	79	118	21	570
1967	704	71	288	29	992
1968	678	20	2,712	80	3,390
1969	562	40	847	60	1,409
1970	408	58	293	42	701
1971	455	8	4,984	92	5,439
1972	472	4	11,441	96	11,913
1973	530	4	13,166	96	13,696
1974	148	1	20,375	99	20,523
1975	107	1	13,148	99	13,255

and necessitating towing back into port. A USA scalloper was run into on the "Northern Edge" of Georges Bank by a Soviet drifter that left the scene in heavy fog without identifying itself and ascertaining damage or injury to personnel.

In 1971, a USA trawler was rammed and sunk on the western side of Georges Bank in the "Great South Channel" by a trawler from Poland. The crew of six was saved, however, all else was lost.

In 1972, a USA trawler was rammed and sunk by a trawler from the GDR. That same year a small USA trawler was lost with its crew of three, allegedly to fishing activity by the FRG in the Gulf of Maine.

In 1968, the offshore lobster pot fishery began to expand. Along with the increase in fixed gear came complaints of gear losses attributed to foreign fishing activity. Table 14 displays by year and country the number of known gear conflicts.

Table 14. Gear conflicts reported by USA fishermen, by year and country.

Country	Year							
	1968	1969	1970	1971	1972	1973	1974	1975
USSR	2	20	22	18	20	3	3	23
Japan		1	3	3	4	3	3	
GDR				1	3	1	1	
Poland			1	1	7	2	3	
Italy						1	1	
Spain	1				3	4	2	2
Bulgaria					2			
Unknown	3	8	14	10	9	22	34	2

In the year 1974 a total of 17 losses of bottom gill net gear was reported. This loss was blamed primarily on trawlers from the FRG and a trawler from Ireland.

There were two cases of lost longline gear attributed to Japanese activity in 1975.

[redacted](3). Nontarget Species Mortalities

Fisheries (main species sought category) in which squid were caught in SA 5 and 6 are presented in Table 15 by country. A total squid catch (Illex and Loligo) of 55,277 tons was taken in 1974, of which 12,853 tons (approximately 23%) occurred as by-catch. A total of 88% of this by-catch occurred in a directed fishery for four other species categories: mackerel (41%), silver hake (25%), red hake (10%), and herring (12%); and 91% was taken by two countries: the USSR (55%) and Poland (36%). In fact, since catch by vessel class is summed by month in ICNAF statistics, some catch of squid that appears to be by-catch may have resulted from a directed fishery. Furthermore, the above figures must be regarded as tentative because squid are reported with other invertebrates in catch by gear tables, and for the USA in particular, invertebrates other than squid are taken as well; consequently, USA figures are not included. It is believed, however, that USA by-catch of squid is relatively minor since its total catch is only about 2,000 tons.

The squid fishery was difficult to identify under the ICNAF catch reporting scheme, since it occurs in a mixed fishery situation. A procedure was adopted of assigning a catch record to the squid fishery if the largest catch was of squid. A catch record lists the catches in a month by species, for a gear-tonnage class category in an ICNAF Division. The international

Table 15. By-catches (metric tons) (and by-catch ratios) of squid taken in 1974 in SA 5 and 6 in designated fisheries (main species sought category) by country[a]

Country	Main Species Sought						
	Silver hake	Red hake	Other groundfish	Herring	Mackerel	Other pelagic fish	Other finfish
Bulgaria	56 (0.034)				536 (.026)		
Canada			0 (0.00)	0 (0.00)			
France				0 (0.00)			
FRG				0 (0.00)			
GDR				0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Japan			1 (0.091)	11 (0.005)		623 (0.188)	
Poland				664 (0.020)	3904 (0.044)		0 (0.00)
Romania				2 (0.002)	7 (0.001)		
USSR	3162 (0.032)	1349 (0.090)	22 (0.040)	896 (0.025)	824 (0.010)	0 (0.00)	796 (0.039)
Total	3,218	1,349	23	1,573	5,271	623	796

[a]USA figures are not available as squid catches are combined with other invertebrates in distribution of catch by gear tables.

squid fishery thus defined had a reported by-catch of 15% of its directed catch in 1974. The predominant by-catches were of other finfish and mackerel representing 49% and 33% of the total by-catch, respectively. This by-catch accounted for 3% (3,421 tons) of the other finfish catch in 1974, and 1% (2,345 tons) of the mackerel catch in 1974. Table 16 lists the 1974 by-catches and by-catch ratios in the squid fishery for all countries combined and for individual countries. For certain fleets (e.g. Poland and the USSR) the by-catch rates are likely to be over-estimated since the mixed fishery classification may result in several directed fisheries being lumped together. Conversely, in other fisheries (e.g. Spain and Italy) where catches other than squid are discarded, the ratio is underestimated. The overall effect of these errors cannot be determined.

(4) Economic Interactions - It is not known to what extent, if any, foreign fishing activities have impacted the domestic squid fishery, since the domestic fishery and the USA market are so small. The impact has probably been minimal. The foreign squid market represents a distinct opportunity for expanding the USA industry.

Table 16. By-catch ratios and catches (metric tons) in squid fishery for 1974 by countries.

Country	Main Species Sought														
	Cod	Haddock	Redfish	Silver hake	Red hake	Pollock	American plaice	Witch flounder	Yellowtail flounder	Other flounder	Herring	Mackerel	Squid	Other fish	Total
Total															
Ratio	0	0	0	0.011	0.007	0	0	0	0	0.004	0.009	0.057	1.000	0.084	1.172
Catch	15	5	0	436	296	0	0	0	4	151	351	2,345	40,842	3,421	47,861
Canada															
Ratio	0	0	0	0	0	0	0	0	0	0	0	0	1.000	0	1.000
Catch	0	0	0	0	0	0	0	0	0	0	0	0	27	0	27
Italy															
Ratio	0	0	0	0	0	0	0	0	0	0	0	0.099	1.000	0	4.680
Catch	0	0	0	0	0	0	0	0	0	0	0	420	4,260	0	1,099
Japan															
Ratio	0	0	0	0.006	0	0	0	0	0	0.004	0	0.004	1.000	0.179	1.193
Catch	0	0	0	104	0	0	0	0	0	72	0	62	16,185	2,836	19,309
Spain															
Ratio	0	0	0	0	0	0	0	0	0	0.002	0	0	1.000	0.008	1.010
Catch	0	0	0	0	0	0	0	0	0	37	0	0	16,144	127	16,308
USA															
Ratio	0.003		0	0.009	0	0	0	0	0.002	0.063	0	0.160	1.000	0.269	1.505
Catch	2		0	6	0	0	0	0	1	40	0	102	638	172	952
USSR															
Ratio	0.009	0.003	0	0.225	0.205	0	0	0	0.002	0.001	0.066	0.010	1.000	0.161	1.632
Catch	13	5	0	326	296	0	0	0	3	2	95	15	1,446	233	2,434
Poland															
Ratio	0	0	0	0	0	0	0	0	0	0	0.120	0.816	1.000	0.001	1.937
Catch	0	0	0	0	0	0	0	0	0	0	256	1,746	2,141	3	4,146

g. History of Regulation of Foreign Fisheries

Regulation of foreign fisheries along the USA coast of the Northwest Atlantic Ocean began in 1949 when the USA convened a conference of 11 countries at Washington, D.C. This conference resulted in the formation of ICNAF, and the USA Northwest Atlantic Fisheries Act of 1950 authorized USA involvement in the activities of the convention. The designated areas were the waters north of 39°00' north latitude and east of 71°40' west longitude. Commission regulations in the early 1950s evolved around the establishment of mesh regulations for certain directed groundfish fisheries, e.g. cod, haddock, with groundfish by-catch provisions for other small-mesh directed fisheries, e.g. silver hake, herring.

During the period from 1950 to 1957 little, if any, enforcement activity was deployed on United States vessels. An enforcement program was organized in 1957 composed of a two-man team effort to organize and activate a viable enforcement program to board and inspect, both dockside and at sea, in conjunction with the USA Coast Guard patrol vessels. The primary purpose was to coordinate a registration program of all USA commercial groundfish trawlers engaged in a directed fishery for haddock and cod. The minimum legal mesh size in effect was 4½ inches for all trawl gear on USA trawlers which were engaged in directed fishing for haddock and cod. Several USA masters were cited for alleged violations, prosecuted in USA Federal Court, and fined for violation of the rules and regulations under authority of the Northwest Atlantic Fisheries Act of 1950.

With the arrival of the distant-water fleets off the USA coast in the early 1960s much discussion was given to the possible extension of territorial waters. Failure to resolve this question through the International Law of the Sea Conferences led to the establishment of a contiguous fishing zone in late 1966 which bounded the entire USA coastline encompassing the waters lying between 3 and 12 miles offshore. Only Canada was authorized to fish within this zone under a reciprocal fishing agreement for the USA fishing industry in similar waters off Canada. However, many USA fishermen continued to complain about fishing conduct by foreign nationals on the high seas. These complaints ranged from infringements by foreign trawlers into the USA 12-mile contiguous fishery zone to harrassment on the high seas pertaining to rules of the road and fishing conduct. Many investigations were activated both dockside and at sea, but USA fishery agents had no authority to board foreign vessels on the high seas.

Prior to adoption of the ICNAF scheme of joint enforcement, each member nation was responsible for the conduct and minotiring of its vessel inspections on the high seas. There were a number of alleged violations reported by USA fishermen during 1966 and 1967; however, a lapse of 2-3 days after observations prevented any meaningful enforcement action. These allegations were for intrusions of the Contiguous Fishery Zone (CFZ) or within the 12-mile zone. Investigations were made by fisheries agents, often with negative results.

As the activity of the distant-water fleets increased, their operations began to expand to waters south of the convention area. Because of the overlap in fish stocks and the known migrations of commercially important species between the convention area and the waters to the south, ICNAF in 1967 adopted the responsibility for collecting statistics for the catches from these waters as far south as Cape Hatteras which was designated Statistical Area 6. Management of the fisheries within these waters, however, had to be accomplished

through a series of bilateral negotiations. These began in 1968 with the USSR and Figures 2-4 indicate the current status of the major country agreements.

Fishery management zones were instituted by ICNAF in 1969 due to the haddock crisis generated by the extremely large catch of haddock by the USSR in 1965. The poor recruitment anticipated in the haddock fishery as indicated by groundfish surveys conducted by scientific personnel from Woods Hole and joint surveys with foreign research vessels was instrumental in adopting seasonal closures. Areal and seasonal zones have periodically been modified and supplemented to protect other species in addition to haddock. These are shown in Figures 5-9.

The haddock management zones were augmented in 1970 with the establishment of TACs for certain haddock stocks considered to have been overfished, and this began the present-day concept of management under an allowable quota system. There are presently 20 species-stocks under a nationally allocated framework of total allowable catches. Table 17 gives the allocations for calendar year 1976.

Unquestionably, problems encountered within the above management framework were instrumental in formulating an International Inspection Scheme approach to these problems, but progress has been slow. On August 11, 1971, the President signed an amendment (P.L. 92-87) to the Northwest Atlantic Fisheries Act of 1950, which authorized national and international measures of control on the high seas adopted under the Convention and supposedly made possible the adoption of the International Inspection Scheme on the high seas under ICNAF. During the latter part of August 1971, an inspection boarding team from the USA attempted to board USSR vessels. The USSR masters refused to permit inspectors to board After a series of diplomatic notes, the USSR advised the

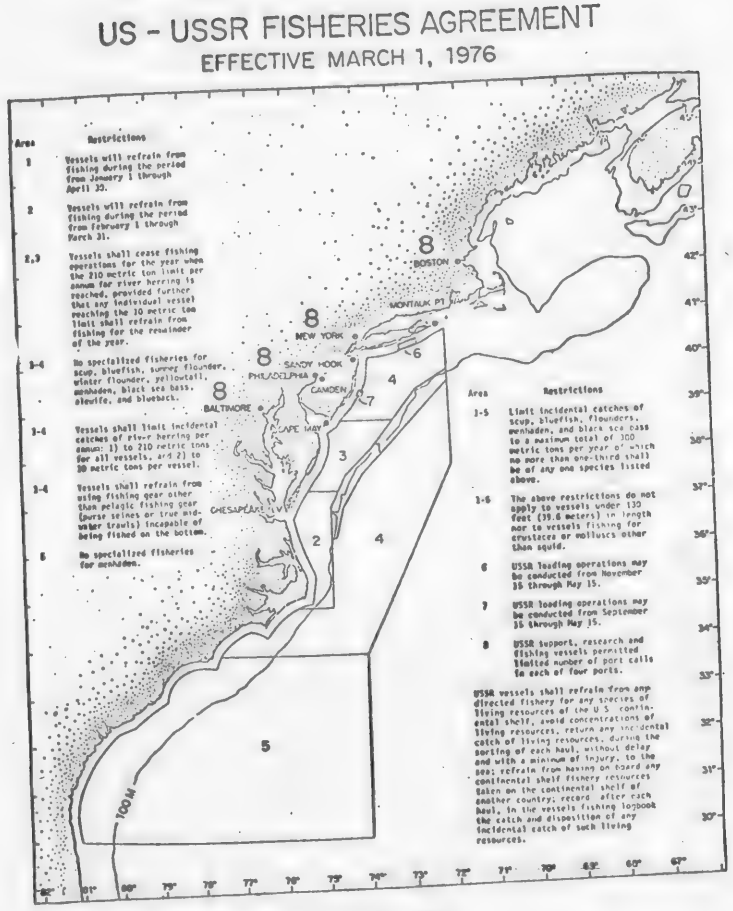

US - USSR FISHERIES AGREEMENT
EFFECTIVE MARCH 1, 1976
Area
Restrictions
1
Vessels will refrain from fishing during the period from January 1 through April 30.
2
Vessels will refrain from fishing during the period from February 1 through March 31.
2,3
Vessels shall cease fishing operations for the year when the 210 metric ton limit per annum for river herring is reached, provided further that any individual vessel reaching the 10 metric ton limit shall refrain from fishing for the remainder of the year.
3-6
No specialized fisheries for scup, bluefish, summer flounder, winter flounder, yellowtail, menhaden, black sea bass, alewife, and blueback.
3-6
Vessels shall limit incidental catches of river herring per annum: 1) to 210 metric tons for all vessels, and 2) to 30 metric tons per vessel.
3-4
Vessels shall refrain from using fishing gear other than pelagic fishing gear (purse seines or true mid-water trawls) incapable of being fished on the bottom.
5
No specialized fisheries for menhaden.
BOSTON
MONTAUK PT
NEW YORK
SANDY HOOK
PHILADELPHIA
CAMDEN
BALTIMORE
CAPE MAY
CHESAPEAKE BAY
100 M
Area
Restrictions
1-5
Limit incidental catches of scup, bluefish, flounders, menhaden, and black sea bass to a maximum total of 300 metric tons per year of which no more than one-third shall be of any one species listed above.
1-6
The above restrictions do not apply to vessels under 130 feet (39.6 meters) in length nor to vessels fishing for crustacea or molluscs other than squid.
6
USSR loading operations may be conducted from November 16 through May 15.
7
USSR loading operations may be conducted from September 16 through May 15.
8
USSR support, research and fishing vessels permitted limited number of port calls in each of four ports.
USSR vessels shall refrain from any directed fishery for any species of living resources of the U.S. continental shelf, avoid concentrations of living resources, return any incidental catch of living resources, during the sorting of each haul, without delay and with a minimum of injury, to the sea; refrain from having on board any continental shelf fishery resources taken on the continental shelf of another country; record after each haul, in the vessels fishing logbook the catch and disposition of any incidental catch of such living resources.

Figure 2. USA-USSR Fisheries Agreement, 1976.

US - POLISH FISHERIES AGREEMENT

EFFECTIVE MAY 29, 1975

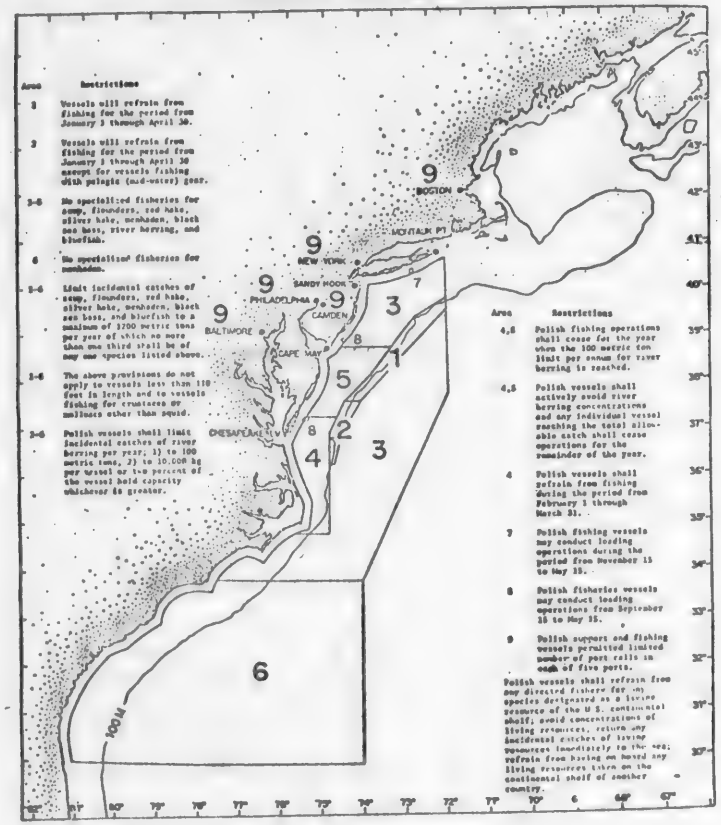

Area Restrictions
1 Vessels will refrain from fishing for the period from January 1 through April 30.
2 Vessels will refrain from fishing for the period from January 1 through April 30 except for vessels fishing with pelagic (mid-water) gear.
2-6 No specialized fisheries for scup, flounders, red hake, silver hake, menhaden, black sea bass, river herring, and bluefish.
6 No specialized fisheries for menhaden.
2-6 Limit incidental catches of scup, flounders, red hake, silver hake, menhaden, black sea bass, and bluefish to a maximum of 3200 metric tons per year of which no more than one third shall be of any one species listed above.
1-6 The above provisions do not apply to vessels less than 110 feet in length and to vessels fishing for crustacea or molluscs other than squid.
2-6 Polish vessels shall limit incidental catches of river herring per year, 1) to 100 metric tons, 2) to 10,000 kg per vessel or two percent of the vessel hold capacity whichever is greater.
Area Restrictions
4,5 Polish fishing operations shall cease for the year when the 100 metric ton limit per annum for river herring is reached.
4,5 Polish vessels shall actively avoid river herring concentrations and any individual vessel reaching the total allowable catch shall cease operations for the remainder of the year.
4 Polish vessels shall refrain from fishing during the period from February 1 through March 31.
7 Polish fishing vessels may conduct loading operations during the period from November 15 to May 15.
8 Polish fisheries vessels may conduct loading operations from September 15 to May 15.
9 Polish support and fishing vessels permitted limited number of port calls in each of five ports.
Polish vessels shall refrain from any directed fishery for any species designated as a living resource of the U.S. continental shelf; avoid concentrations of living resources, return any incidental catches of living resources immediately to the sea; refrain from having on board any living resources taken on the continental shelf of another country.
BOSTON
MONTAUK PT
NEW YORK
SANDY HOOK
PHILADELPHIA
CAMDEN
BALTIMORE
CAPE MAY
CHESAPEAKE B.
100 M

Figure 3. USA-Polish Fisheries Agreement.

US - ROMANIA FISHERIES AGREEMENT

EFFECTIVE NOVEMBER 21, 1975

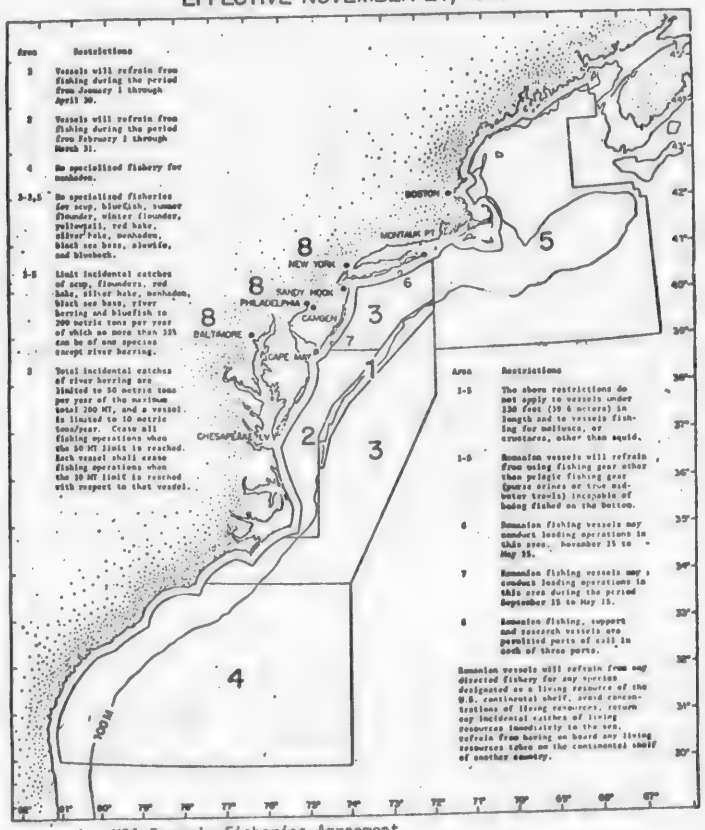

Area Restrictions
1 Vessels will refrain from fishing during the period from January 1 through April 30.
2 Vessels will refrain from fishing during the period from February 1 through March 31.
4 No specialized fishery for menhaden.
1-3,5 No specialized fisheries for scup, bluefish, summer flounder, winter flounder, pollewpoll, red hake, silver hake, menhaden, black sea bass, alewife, and blueback.
1-5 Limit incidental catches of scup, flounders, red hake, silver hake, menhaden, black sea bass, river herring and bluefish to 200 metric tons per year of which no more than 33% can be of one species except river herring.
2 Total incidental catches of river herring are limited to 50 metric tons per year of the maximum total 200 MT, and a vessel is limited to 10 metric tons/year. Cease all fishing operations when the 50 MT limit is reached. Each vessel shall cease fishing operations when the 10 MT limit is reached with respect to that vessel.
Area Restrictions
1-5 The above restrictions do not apply to vessels under 150 feet (39.6 meters) in length and to vessels fishing for molluscs, or crustacea, other than squid.
1-5 Romanian vessels will refrain from using fishing gear other than pelagic fishing gear (purse seines or trwl mid-water trawls) incapable of being fished on the bottom.
6 Romanian fishing vessels may conduct loading operations in this area. November 15 to May 15.
7 Romanian fishing vessels may conduct loading operations in this area during the period September 15 to May 15.
8 Romanian fishing, support and research vessels are permitted ports of call in each of three ports.
Romanian vessels will refrain from any directed fishery for any species designated as a living resource of the U.S. continental shelf, avoid concentrations of living resources, return any incidental catches of living resources immediately to the sea, refrain from having on board any living resources taken on the continental shelf of another country.
BOSTON
MONTAUK PT
NEW YORK
SANDY HOOK
PHILADELPHIA
CAMDEN
BALTIMORE
CAPE MAY
CHESAPEAKE B.
100 M

Figure 4. USA-Romania Fisheries Agreement.

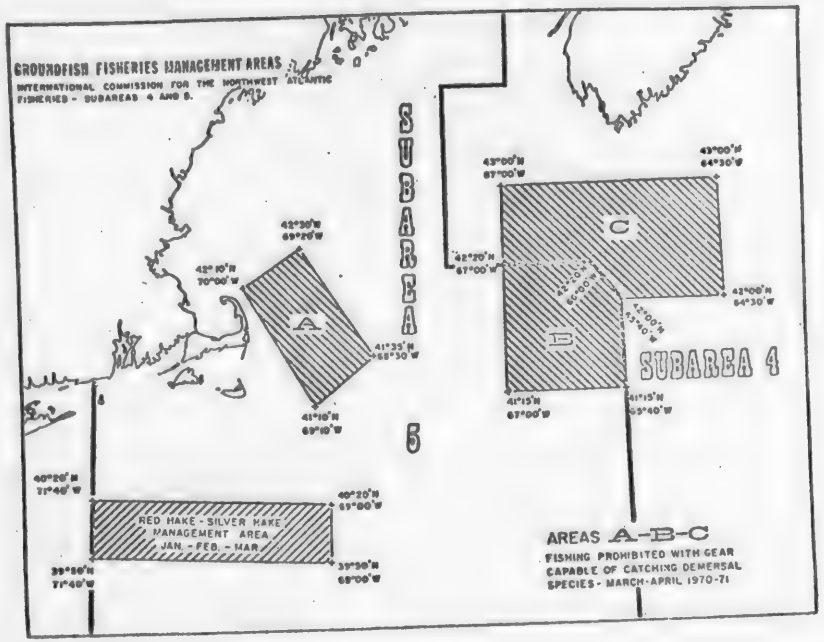

GROUNDFISH FISHERIES MANAGEMENT AREAS
INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES - SUBAREAS 4 AND 5.
SUBAREA 5
SUBAREA 4
A
B
C
RED HAKE - SILVER HAKE MANAGEMENT AREA JAN. - FEB. - MAR.
AREAS A-B-C
FISHING PROHIBITED WITH GEAR CAPABLE OF CATCHING DEMERSAL SPECIES - MARCH-APRIL 1970-71

Figure 5. ICNAF Conservation Areas, 1970-1971.

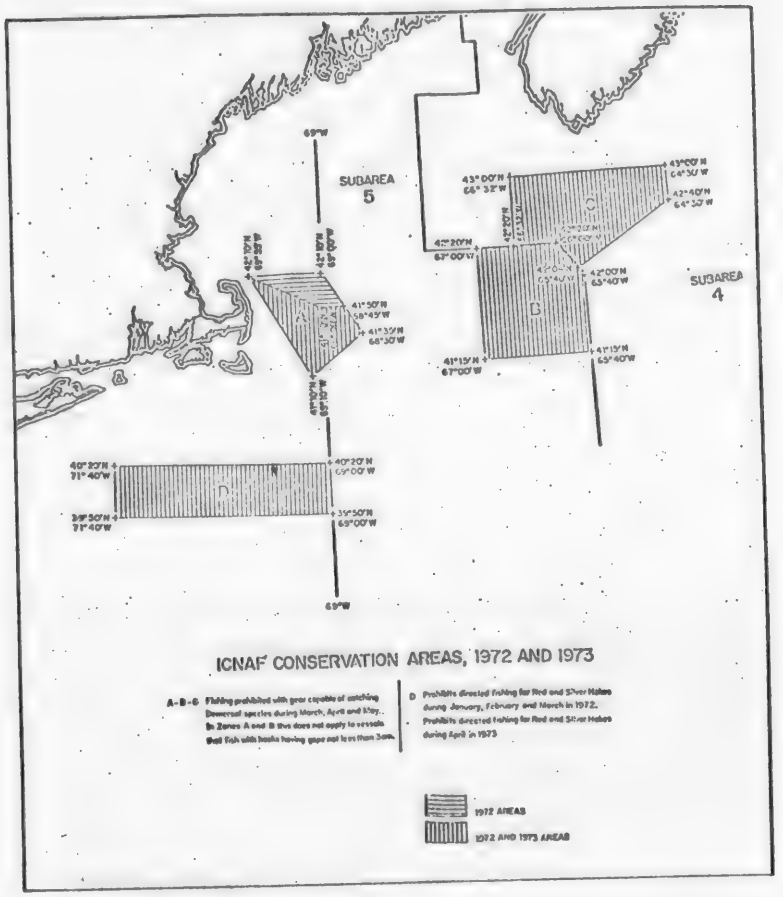

SUBAREA 5
SUBAREA 4
A
B
C
D
ICNAF CONSERVATION AREAS, 1972 AND 1973
A-B-C Fishing prohibited with gear capable of catching Demersal species during March, April and May. In Zones A and B this does not apply to vessels that fish with hooks having gape not less than 3cm.
D Prohibits directed fishing for Red and Silver Hakes during January, February and March in 1972. Prohibits directed fishing for Red and Silver Hakes during April in 1973
1972 AREAS
1972 AND 1973 AREAS

Figure 6. ICNAF Conservation Areas, 1972 & 1973.

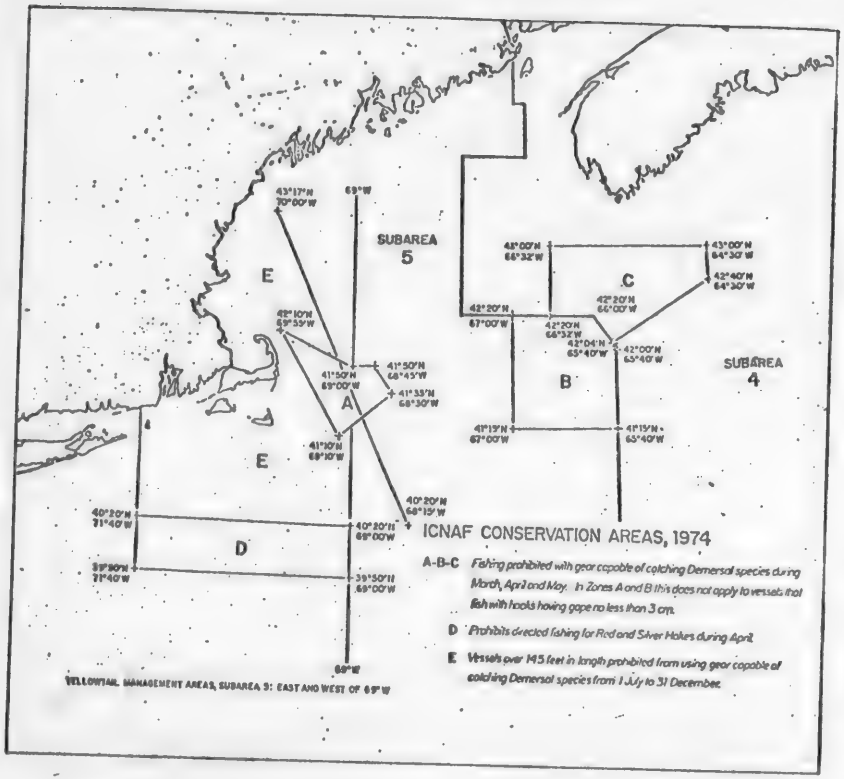

SUBAREA 5
SUBAREA 4
A
B
C
D
E
ICNAF CONSERVATION AREAS, 1974
A-B-C Fishing prohibited with gear capable of catching Demersal species during March, April and May. In Zones A and B this does not apply to vessels that fish with hooks having gape no less than 3 cm.
D Prohibits directed fishing for Red and Silver Hakes during April.
E Vessels over 145 feet in length prohibited from using gear capable of catching Demersal species from 1 July to 31 December.
YELLOWTAIL MANAGEMENT AREAS, SUBAREA 5: EAST AND WEST OF 69° W

Figure 7. ICNAF Conservation Areas, 1974.

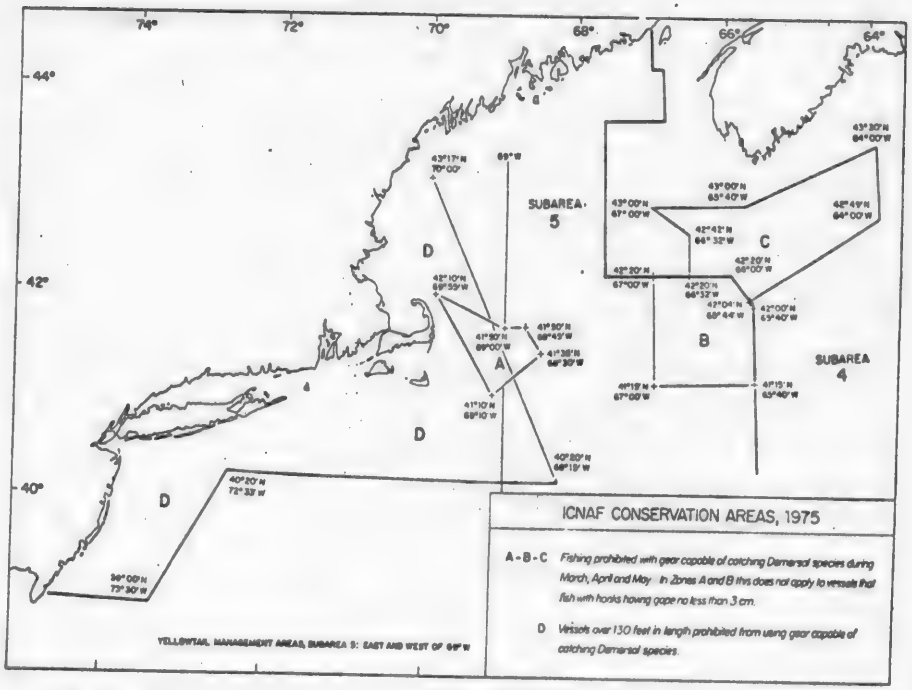

SUBAREA 5
SUBAREA 4
A
B
C
D
ICNAF CONSERVATION AREAS, 1975
A-B-C Fishing prohibited with gear capable of catching Demersal species during March, April and May. In Zones A and B this does not apply to vessels that fish with hooks having gape no less than 3 cm.
D Vessels over 130 feet in length prohibited from using gear capable of catching Demersal species.
YELLOWTAIL MANAGEMENT AREAS, SUBAREA 5: EAST AND WEST OF 69° W

Figure 8. ICNAF Conservation Areas, 1975.

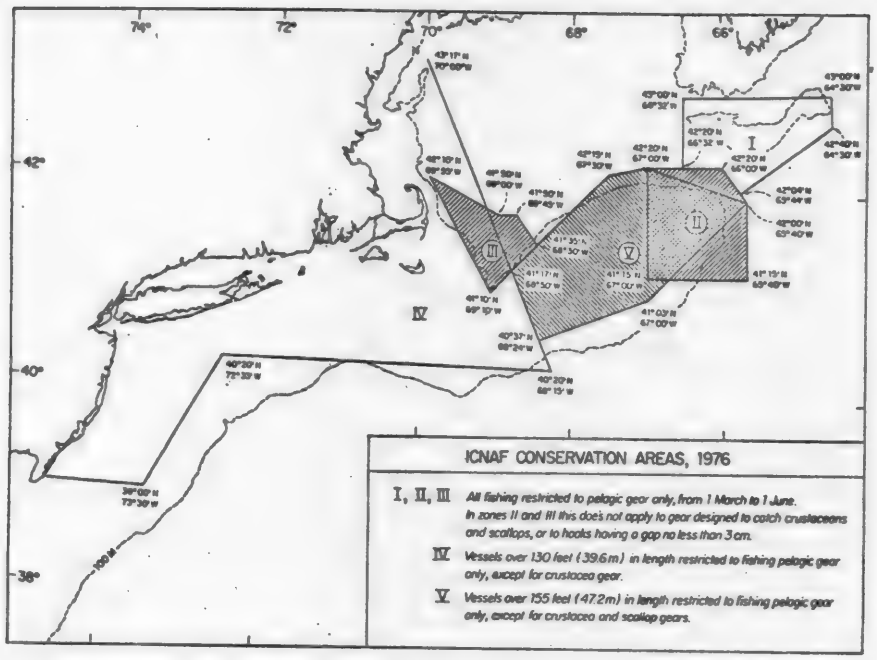

74°
72°
70°
68°
66°
42°
40°
38°
I
II
III
IV
V
ICNAF CONSERVATION AREAS, 1976
I, II, III All fishing restricted to pelagic gear only, from 1 March to 1 June. In zones II and III this does not apply to gear designed to catch crustaceans and scallops, or to hooks having a gap no less than 3 cm.
IV Vessels over 130 feet (39.6 m) in length restricted to fishing pelagic gear only, except for crustacea gear.
V Vessels over 155 feet (47.2 m) in length restricted to fishing pelagic gear only, except for crustacea and scallop gears.

Figure 9. ICNAF Conservation Areas, 1976.

Table [illegible] Total Allowable Catches (metric tons) for 1976.

Stock	COD		HADDOCK		RED-FISH	SILVER HAKE		RED HAKE		POLLOCK	YELLOWTAIL FLOUNDER		OTHER FLOUNDERS		SQUID (Illex)	SQUID (Loligo)	MENHADEN		MACKEREL	OTHER FINFISH	Unspecified Stocks	TOTAL TAC
	SA 1	SA 2	3	4	SA 3	SA 4	Subarea 5	SA 4	Subarea 5	Subarea 5	SA 5	Subarea 6	SA 5	Subarea 6	SA 5+6	SA 3+4	SA 3	SA 4	SA 3+4	SA 3+4		
BULGARIA							600															
CANADA	175	4519	1200							32000								950	3000	6400		14400
CUBA		400				250		1400	900	1200						1000		1000	7000	3000		18250
FRANCE																		1100				21000
FRG										1400						1000		5700	1700			2750
GDR										3000								9300	49700	2000		14900
ITALY															1000	3300						48750
JAPAN																15700		1200				6000
POLAND		657													2000	1200		11000	70300	10000		18977
PORTUGAL																						26300
ROMANIA				343														800	2000			2852
SPAIN		6645	300							1200					5000	6000						16000
USSR		2314		1420		34400	20000	19000	9400	2100					7500	7000		12100	80000	50000		177250
USA	7850	20000	4400	13000	9500	8500	9000	1000	6000	11500	12000	2000	15000		7300	6000		6000	12500	6700	60000	170000
OTHER	25	665	50	2219	500	4750	4000	4000	100	400	100	10	500		4000	2000		50	50	2000	10000	1450
TAC	8000	35000	6000	17000	10000	48000	43000	25000	16000	55000	12000	4000	20000		20000	44500		7000	60000	214000	140000	650000

*By-catch only with an directed fishery.

USA that they were ready to accept inspection schemes, but the inspection would be limited to the main fishing deck only. Since implementation of the ICNAF inspection scheme, 57 boardings were made on foreign vessels between August 30, 1971 and November 1, 1972. Five violations were recorded for refusal to accept boarding inspection teams. The reservation concerning below-deck inspection was lifted by the USSR in November 1973, thus enabling the international inspection scheme to gain a better insight regarding fish species composition below deck. The large catches of demersal species taken as by-catch by foreign nationals was finally documented and was instrumental in leading to ICNAF adoption of additional controls such as prohibiting vessels in excess of 130 ft to use demersal gear except in restricted zones. Most recently, the ICNAF 155-ft rule was impelmented in the Georges Bank area to reduce the by-catch of groundfish by large foreign trawlers. Only true pelagic gear was allowed for vessels exceeding 155 feet in length.

The past two years have shown remarkable progress and improvement by all foreign nationals in adhering to the ICNAF regulations (Table 18). The additional increase in manpower and funding for NMFS has created an atmosphere of cooperation by exerting increased pressure on the other nations in our accelerated high seas boarding programs in cooperation with the USA Coast Guard.

Table 18. Summary of alleged violations by foreign nationals, 1971-1976

1971	1972	1973	1974	1975	1976
5	8	27	98[a]	24	36[a]

[a]Mostly logbook discrepancies.

[redacted]h. History of Cooperative Research, Conservation, Management, and Data Exchange

Management of squid in ICNAF SA 5 and 6 began in 1974, when the ICNAF Standing Committee on Research and Statistics (STACRES) recommended a preemptive Total Allowable Catch (TAC), of between 50,000 and 80,000 tons for this stock. This was based on a 1973 assessment of the Loligo stock by Japanese scientists. The TAC set for both species (Loligo and Illex) was 71,000 tons for both 1974 and 1975.

Based on updated assessments for Loligo by Japanese scientists and estimates of stock biomass from USA research vessel surveys, separate TACs were set by species (30,000 tons for Illex and 44,000 tons for Loligo) for 1976. Cooperative research on these stocks has involved research vessel surveys (Table 19) and assessment studies and related work by USA, Canadian, French, Japanese, Spanish, and USSR scientists.([redacted]). In addition, Japan, Poland, the USA, and the USSR have reported length-frequency and age sampling data to ICNAF in recent years (Tables 20 and 21).

Table 19. Summary of cruises by nation and year providing data of potential value for squid in SA 5 and 6, 1969-1974.

Nation	Year	Vessel	General Objective(s)
USSR	1969	Ekliptika	Groundfish survey
	1970	Kvant	Groundfish survey, gear comparison
	1971	Blesk	Groundfish survey, gear comparison
	1972	Blesk	Groundfish survey, gear comparison
	1973	Belogorsk	Groundfish survey, gear comparison
	1974	Belogorsk	Groundfish survey, gear comparison
	1975	Belogorsk	Groundfish survey, gear comparison
France	1973	Cryos	Squid survey
	1974	Cryos	Squid survey
	1975	Cryos	Squid survey
FRG	1973	W. Herwig	Fish survey
GDR	1975	Ernst Haeckel	Fish survey
Poland	1973	Wieczno	Fish survey
USA	1969	Albatross IV	Groundfish survey (3)
	1970	Albatross IV	Groundfish survey (4), plankton
	1970	Delaware II	Groundfish survey, gear comparison
	1971	Albatross IV	Groundfish survey (2), gear comparison
	1972	Albatross IV	Groundfish survey (3), gear comparison
	1973	Albatross IV	Groundfish survey (2), gear comparison
	1974	Albatross IV	Groundfish survey (4), gear comparison
	1975	Albatross IV	Groundfish survey (4), gear comparison
	1975	Albatross IV	Groundfish survey, plankton

Table 20. Total number of Loligo length-frequency samples reported to ICNAF by nation and year for SA 5 and 6 during the period 1972-1974.

Year	USSR	USA	Japan
1972			15
1973	42		10
1974	28	8	110

Table 21. Total number of Illex length-frequency samples reported to ICNAF by nation and year for SA 5 and 6 during the period 1972-1974.

Year	USSR	USA	Japan	Poland
1973	68	4		23
1974			68	

III. STATUS OF FISHERY STOCK

a. Distribution of Exploited Stocks

In the absence of evidence to the contrary, it has been assumed that the fishing for long-finned squid (Loligo), off the northeastern USA exploits a single stock distributed from Cape Hatteras to the northern edge of Georges Bank. Fishing activities north and south of the region are probably of minor consequence.

The short-finned squid (Illex) has a more northerly distribution, extending from at least Newfoundland to the mid-Atlantic Coast of the USA. Again, there is no evidence to support the designations of separate stocks within the range of the population exploited in the Northwest Atlantic, and consequently Illex squid in this region have been considered as a unit stock. In recent years, ICNAF has established separate quotas for SA 3 and 4 and for SA 5 and 6 based on a single assessment of the stock throughout its range followed by apportionment between the two regions.

b. Abundance of Exploited Stocks

Stock size estimates of Loligo and Illex populations in SA 5 and 6 were reviewed in a recent ICNAF Research Document (Sissenwine 1976). All of these estimates are subject to considerable error. Of the estimates available, the most useful are minimum stock size estimates for Loligo based from the autumn US bottom trawl survey (Table 22). These estimates in Table 23 indicate a recent increase in abundance of Loligo for SA 5 and 6.

Table 22. Loligo minimum stock size estimates

Year	Biomass (tons)	Number ($X10^6$)
1968	72,700	1,800
1969	57,400	1,400
1970	35,400	1,000
1971	22,100	1,200
1972	29,500	1,200
1973	77,500	2,700
1974	72,300	2,400
1975	97,300	5,600

Efanov and Puzhakov (1975) estimated the size of the stock of Illex from southern Nova Scotia to Georges Bank during June 1971 as 110,000 tons (about 1.25 billion individuals). No description of details of the method used was given, therefore, it is difficult to judge the accuracy of this estimate. Unfortunately, no more reliable information on Illex stock size is available.

(1). Equilibrium Yield Curves

Because of the brief history of the fishery for squid in SA 5 and 6, and the lack of fishing effort data, the equilibrium yield curve of the fishery can only be estimated in relation to an assumed stock-recruitment functions (see next section).

(2). Yield per Recruit

Models designed to simulate the effect of fishing on squid (Loligo and Illex) were developed by Sissenwine and Tibbetts (1976). Instantaneous growth and fishing and natural mortality rates varied on a monthly basis in a realistic manner (most fishing mortality for Loligo ocurred during winter, while for Illex most occurred during summer). Recruitment was described by the Beverton and Holt (1957) stock recruitment function.

Based on these models, the maximum yield per recruit (Y_{msy}) of Loligo and Illex is about 38 g and 45 g at an exploitation rate (over the lifespan of the species: E_{msy}) of 75% and 63%, respectively. If recruitment is moderately dependent on spawning stock size (see II.C.2.b.(4)), then the maximum sustainable yield per recruit to the unexploited fishery is 21 g and 25 g for Loligo and Illex, respectively, with E_{msy} equal to 40% and 37%, respectively. For a strong relationship between stock and recruitment (see II.C.2.b.(4)), the corresponding values are 8 g and 15% for Loligo, and 9 g and 15% for Illex. These results, along with the average weight of individuals of the catch at E_{msy} (W_{msy}) according to the above simulations, are summarized in Table 31.

Table 23 Squid stock-recruitment characteristics

Species	Stock-recruitment	Y_{msy}	E_{msy}	W_{msy}
Loligo	None	38 g	75%	52 g
Loligo	Moderate	21 g	40%	72 g
Loligo	Strong	8 g	15%	85 g
Illex	None	45 g	63%	72 g
Illex	Moderate	25 g	37%	90 g
Illex	Strong	9 g	15%	100 g

[redacted](3). Cohort Analysis

Without a reliable method to determine the age of squid landed and the age composition of the catch, only a crude approach to cohort analysis is possible. Ikeda and Sato (1976) approximated the age composition of the Japanese catch of Loligo for the 1972-1973 and 1973-1974 fishing seasons based on length composition and a hypothetical growth function. Cohorts were defined as monthly brood groups, and the estimated brood composition of the catch was used to calculate the number and exploitation rate of Loligo in the April, May, and June broods at the beginning of the fishing season. Sissenwine (1976) was critical of these results because of possible errors in the assignment of individuals to broods, inadequate data on natural mortality, and the small portion of the total catch resulting from the broods that was considered in the analysis.

[redacted](4). Stock-Recruitment Relationships

The degree of dependence between spawning-stock size and recruitment is unknown. The simulation models ([redacted]b.(1)) considered three hypothetical relations in order to estimate the maximum sustainable yield per recruit to the unexploited population for a range of stock-recruitment circumstances. The three relationships considered are shown in Figure 10.

[redacted]c. Current Fishing Status

Of the two species of squid available in New England waters, the long-finned or winter squid (Loligo pealei) is the species most heavily fished by the USA. It is available inshore from April to September and is trawled by boats from such ports as Point Judith, New Bedford, and Newport. Distant-water fleets catch Loligo offshore during the winter months. The demand for Loligo has mostly been for the export market with only a small amount going toward domestic ethnic sales.

The short-finned or summer squid (Illex illecebrosus) is fished by the USA only in small quantities from April to September. Illex is used mostly for bait in sport fisheries. Except for the Illex trap fisheries from Provincetown and Chatham, the squid is trawled. Foreign boats trawl for Illex during the same months, but on the edge of the continental shelf, whereas the USA fishes on the shelf. There is no significant recreational fishery for either species of squid at present, although it is believed to play an important role as a prey species for gamefish.

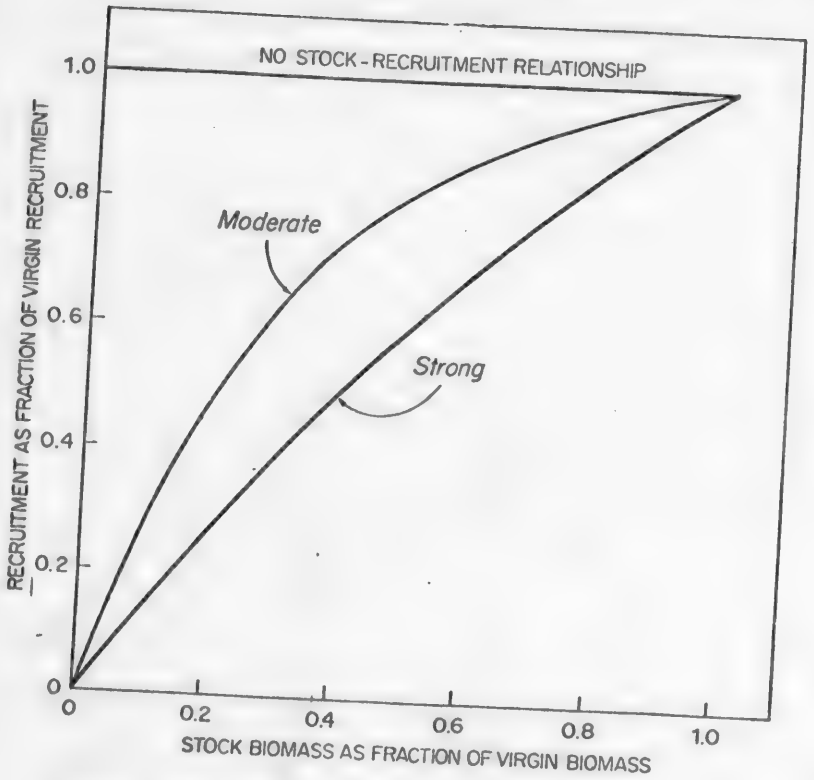


Figure 10. Squid stock-recruitment relationships.

Because much of the catch of squid is not reported by species, only estimates of the catch of Loligo and Illex by month are available for some countries. Monthly catches by country of Loligo and Illex for 1974-1975 are given in Tables [illegible] and [illegible]. Those catches which have not been reported by species are reported as estimated by Sissenwine and Tibbetts (1976). By-catch of the squid fishery is considered in section II.C.1.f.(3).

IV [illegible] OPTIMALITY

According to the Fisheries Conservation and Management Act of 1976, the optimum yield of a fishery means the amount of fish -

(a) which will provide the greatest overall benefit to the Nation, with particular reference to food production and recreational opportunities; and

(b) which is prescribed as such on the basis of the maximum sustainable yield from such fishery, as modified by any relevant economic, social, and ecological factors.

The specific criteria to be used to calculate optimum yield in the future will be determined by Regional Councils. In the interim, ICNAF's determination of optimum yield (OY) for 1977 is proposed in this document, with the constraint that US harvesting capacity must be met prior to any allocation of surplus to foreign nationals. The primary objective of ICNAF has been to maximize long-term catch. The proportion of the TAC of each fishery allocated to foreign nations was determined in order to benefit the US based on relevant economic, social, and ecological factors as expressed by advisors to the USA delegation to ICNAF. Some approaches to the management of fisheries, which have been the basis of the advice of the Standing Committee on Research and Statistics (STACRES) considered by ICNAF commissioners in the establishment of TACs is discussed below.

Table 24. Estimated catches of Loligo and Illex as reported by Sissenwine and Tibbetts (1976).

	1974												
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Loligo													
Bulgaria		56	74	126	23	8	1					12	300
Canada	27												27
Italy	700	800	1,000								450	330	3,280
Japan	2,393	701	2,083	546	200	46	56	168	246	455	2,810	3,789	13,493
Poland			10		197					126	521	800	1,653
Spain	3,657	2,250	1,410	588	424	433	329	160	99	21			9,371
USSR	146		528	1,027	105	115	96	72	712	673	479	267	4,485
USA	137	67	58	328	533	278	139	95	105	141	128	130	2,141
Total	7,060	3,874	5,543	2,615	1,482	880	621	495	1,162	1,416	4,388	5,328	34,750
Illex													
Bulgaria		12	8	164	60	13	35					1	293
Italy	250	200	250								180	100	980
Japan	1		111	368	390	160	320	258	924	250	105	430	3,314
Poland			79	2,544	1,596	526	87			68	22	28	5,052
Romania		1		1	2	4	1						9
Spain	329	358	972	1,397	938	1,243	937	581	64	10			6,769
USSR	8		48	54	942	1,032	862	653	126	119	84	17	3,945
USA						32	14	15	29	36	21	1	148
Total	588	607	1,468	4,528	3,928	3,112	2,256	1,507	1,143	483	412	577	20,510

Table 25. Estimated catches of Loligo and Illex as reported by Sissenwine and Tibbetts (1976).

	1975												
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Loligo													
Bulgaria				19	20	25							74
FRG											1		1
GDR				14	9	370	60	162			4	1	620
Italy	540	580	500	162		390			105	205	505	403	3,390
Japan	3,085	853	978	1,031	44			4	8	81	1,443	3,348	10,746
Poland	940	756	178	122	23		3	147	9	3	417	1,191	3,785
Spain	914	2,502	1,887	973		595			22		582	615	8,090
USSR	255	160	883	2,983	258				24	14	396	430	5,103
USA	86	113	134	109	314	136	75	11	82	125	238	190	1,593
Total	5,820	4,974	4,171	5,423	668	1,516	138	324	230	388	3,586	6,168	33,406
Illex													
Bulgaria		15	6	4	48	47							120
FRG								45		20	1		66
GDR								278					278
Italy	140	130	120	40			160		89	107	87	70	943
Japan	304	40	39	114	157	210	445	867	309	251	429	256	3,236
Poland				40	1,032	1,524	416	37	2				3,051
Romania								48					48
Spain	45	120	84	108			852	306	106		123	54	1,798
USSR	80	91	6	124	774	300	1,418	832	118	8	83	37	3,825
USA						20	7	69	5	8	3		107
Total	571	396	255	430	2,011	2,101	3,302	2,282	629	393	726	416	13,472

As a consequence of differences in the nature of the dynamic models used for assessment, two measures of the instantaneous fishing mortality rate (F_{max} and F_{MSY}) have been identified as reference points on which to base regulations for optimum yield. F_{max} refers to the instantaneous fishing mortality rate at which average yield per recruit is at a maximum. It is a function of the growth and natural mortality processes within the stock and of the size (age) at which individuals enter (i.e. recruit to) the fishery, and is therefore independent of changes in recruitment. F_{MSY}, on the other hand, refers to the fishing mortality rate at which the average long-term catch from the stock as a whole is highest and is therefore a function of the total production processes within the stock, including recruitment. Where the average level of recruitment does not change directly in response to changes in stock size, F_{max} and F_{MSY} will correspond. In the absence of detailed knowledge of the relationship between stock and recruitment for particular stocks, this correspondence was assumed by ICNAF in the presentation of scientific advice on management action prior to 1976.

STACRES examined the principal features of the F_{max} reference point and identified the following as being of particular importance with regard to its adequacy as a basis for management actions:

(a) The form of the relationship between catch per recruit and fishing mortality (F) differs markedly for various stocks according to their growth and natural mortality characteristics. For some stocks, F_{max} occurs at a relatively high level of fishing mortality and it may not be clearly defined. Furthermore, its value for each stock is dependent upon the age and pattern of recruitment to the fishery.

(b) Although F_{max} defines the fishing mortality rate at which the greatest catch will be obtained from each recruit entering the fishery by taking no account of the relationship between the size of the spawning stock and recruitment, it does not necessarily correspond with that giving the highest average catch (MSY) for the stock as a whole (although, as indicated above, it does so if average recruitment does not change with changes in stock size).

(c) Because F_{max} takes no account of the stock and recruitment relationship, management measures based on this reference point do not guarantee the maintenance of spawning stock at a level that would ensure the maintenance of an optimum average level of recruitment.

(d) The F_{max} level of fishing takes no account of possible economic objectives and factors.

This indicates that the F_{max} reference point has potential limitations which have to be recognized and evaluated in the provision of scientific advice on management action. They are obviously greatest with respect to stocks for which the relationship between catch per recruit and fishing mortality has no clearly defined maximum or, if present, it occurs at a relatively high value of fishing mortality rate. In these situations the setting of TACs for catch quota regulation at the F_{max} level may lead to severe reduction in the stock size, reduction in the number of age groups in the exploited stock, large short-term changes in catch (and hence in the magnitude of the short-term changes which must be made in the OY's), and possible recruitment failures due to the generation of too low spawning stock sizes.

The principal element of the biological system governing the adequacy of F_{max} as a basis for management action is the recruitment process, both its variability due to environmental factors and especially the relationship between recruitment levels and spawning stock size. At present, little is known about the latter relationship, so that the evaluation has usually to be made on a generally qualitative basis using all available information on the size and composition of the stock and the observed variability in recruitment to it together with its relation to other components of the exploited ecosystem. However, the relationship is taken into account empirically in some assessment models.

In view of the possible large adverse consequences of setting the fishing mortality rate too high in cases where there is doubt about its adequacy, a more restrictive management system than that based on the F_{max} level of fishing mortality rate would be justified. In addition to appropriate measures for controlling the size (age) of recruitment to the fishery (e.g. through mesh regulation), the management system might comprise either, or a combination, of the following elements: (i) fixing the fishing mortality rate in the exploited phase at a level somewhat lower than F_{max}, and (ii) setting a target spawning stock size.

For stocks in which the relationship between catch per recruit and fishing mortality is a relatively flat-topped curve, a lower fishing mortality rate than F_{max} can be set which would result in only a small loss in average catch but would achieve a substantially higher average stock biomass, greater stock stability due to the presence of a larger number of age groups in the exploited phase, higher average catch per unit of effort, and increased economic efficiency. The $F_{0.1}$ level, defined as the level at which the change in yield per recruit with respect to change in mortality rate is one-tenth of that of the fishery beginning on the virgin stock, has been specified as another possible reference point below F_{max}. It results in an increased catch per unit of effort, but it does not have the unique merit in necessarily achieving the desired stability of stock size and recruitment. This level of F was used as a basis for the 1977 TACs established for several stocks.

The establishment of a minimum spawning stock size constraint, as an element of the management objective, serves to minimize the risks of stock depletion and recruitment failure and hence should be, as far as possible an integral part of the scientific evaluation leading to the advice on specific management measures. At present, however, owing to the lack of knowledge on stock and recruitment relationships for squid the precise value of the limiting stock size cannot be defined. Results of a theoretical study suggest that, at least for some stocks, an equilibrium spawning stock biomass constraint at a biomass level about two-thirds of that of the virgin stock would provide an adequate biomass buffer for maintaining stock stability and resilience against depletion in the presence of large fluctuations in recruitment.

The risks inherent in a management system based on the exploitation of individual fish stocks at their F_{max} (F_{MSY}) levels are particularly large in fisheries on multi-species resources, in which the exploitation of each stock separately is not possible due to the presence of biological interactions.

In such situations, the objective of fishing each stock at the F_{max} level may lead to its depletion and a possible decrease in the long-term catch of the

principal components of the commercial fisheries (although the total biomass available for exploitation may not decrease). The adoption of management measures, which maintain an adequate spawning biomass of the desired species, is particularly important in such cases. The second-tier quota system adopted for SA 5 and 6, establishing a TAC on total catch of all finfish and squid (except menhaden, billfishes, tuna, and large sharks) was designed to provide such a safequard.

a. Relevant Socioeconomic Factors

For purposes of this plan, a primary economic consideration is the estimated capacity of the USA industry to harvest and market squid. The determination of this capacity is extremely difficult due to the large number of variables that must be considered. The approach taken here involves consideration of previous species landings modified by relevant considerations (e.g. new markets and/or products, unavailability of traditional finfish species). Additionally, recreational interests should also be considered due to the importance of squid as a bait and prey species.

b. Optimum Yield

The optimum yield from fisheries for Loligo and Illex in SA 5 and 6 was determined by ICNAF commissioners based on scientific, social, and economic considerations. The optimum yield (ICNAF TAC) of Loligo and Illex in SA 5 and 6 for 1977 is 44,000 and 35,000 tons, respectively.

If recruitment of Loligo is moderately dependent on spawning stock size, then E_{msy} is estimated as 0.40 and the average weight of individuals in the catch is estimated as 72.4 g (see section [redacted] b.(2)). Therefore, if 1.5 billion Loligo are recruited annually, a catch of 44,000 tons would be approximately the maximum sustainable yield under the assumptions of the

Recent minimum stock size estimates indicate from 1.0 billion to 5.6 billion Loligo in SA 5 and 6 during the fall of the year, most of which are new recruits (see section [redacted] b.). Therefore, recruitment of at least 1.5 billion individuals for 1977 seems likely. The assumption is that a moderate stock recruitment relationship at this point in time appears responsible in terms of maintaining stock size based on examination of recent catch levels and estimated stock sizes. For this species the optimum yield for 1977 is approximately equal to the estimated maximum sustainable yield of the fishery.

In the absence of reliable estimates of stock size and uncertainty as to catch statistics of recent years, the 1977 optimum yield of Illex can only be considered as a preemptive quota instituted to regulate the orderly development of the fishery. The maximum sustainable yield of Illex has been estimated as 40,000 tons but this is only a preliminary estimate and therefore it is prudent to restrict catch below this level.

c/d Estimated Domestic Production Potential and Allowable Foreign Surplus

The capacity of the US to exploit squid in 1977 was estimated as 36,500 tons by representatives of the US fishing industry acting as advisors to ICNAF. This would leave 42,500 tons of squid of both species in SA 5 and 6 as a foreign surplus. Specific figures by stock are shown in Table 34.

Table 26. Squid optimum yield and allocations

Species	Maximum Sustainable Yield (metric tons)	Optimum yield (metric tons)	US Capacity (metric tons)	Foreign surplus (metric tons)
Illex	40,000	35,000	11,500	23,500
Loligo	44,000	44,000	25,000	19,000

As was stated previously, the squid fishery and squid markets in the USA are extremely small. On the other hand, foreign fisheries and markets have been quire significant, and this fishery could be quite promising in terms of the European export potential. Before these potential markets can

be exploited to any significant extent, however, major obstacles will have to be resolved by the US fishing industry in terms of harvesting, storage, processing, and marketing. It obviously would be advisable to conduct an economic feasibility study addressing each of these issues vis-a-vis the 36,500 MT estimated US capacity; however, available time does not permit this. Nevertheless, some industry spokesmen feel these problems can be addressed and have requested the larger allocation to assist development efforts The US will reconsider its capacity in June, 1977, based on the catches of squid up to that date.

V. CONSERVATION AND MANAGEMENT MEASURES APPLICABLE TO FOREIGN FISHERIES

a. Data to be Reported by Foreign Fishery,

Sampling and reporting procedures described below are designed to contribute to continuing needs for assessment of the status of stocks; further, they conform to requirements agreed to under Governing International Fisheries Agreements (GIFAS). However, specific needs may develop from time to time which require a change in standard procedures, or additional data for special studies. Also, the pattern of fisheries will change. These aspects require that the procedures for reporting must be flexible enough to accommodate necessary changes and also imply that some form of archiving of the basic data be developed so that retrieval at a later date in a different format is possible.

All data described below will be reported to the Director, Northeast Fisheries Center, National Marine Fisheries Service, Woods Hole, Massachusetts:

1. Statistical Information Requirements for all Fisheries Catch and Effort:

Three months after the close of each quarter, catch-effort statistics for biweekly time periods for 0^{o} 30' square areas will be reported by vessel for the previous quarter. These will be reported using $0^{o}30'$ square Statlant 21B Forms or magnetic tape, computer cards, or printouts for all species and gear types.

Vessel logbook data are to be available for selected, specific joint assessment studies. The collection of samples, specified in 2. below, should also be annotated in the logbook.

2. Procedures for Scientific Samples

a. Length-age species composition samples

(1) Samples should be taken separately for each gear type (e.g. bottom trawl, pelagic trawl, purse seine) and water layer (e.g. on the bottom, midwater level) combination every month for which fishing is pursued by 30-minute square areas throughout the agreement region. One sample should be taken for every 1,000 tons or fraction thereof within the above categories.

(2) Data to be recorded for each sample:

(a) Vessel classification

(b) Method of fishing, e.g. pelagic

(c) Specific type of trawl, including reference to its construction or actual scale drawing

(d) Mesh sizes

(e) Tonnage of the species sampled in the trawl haul

(f) Total weight of the fish sampled

(g) Time of day of haul

(h) Date

(i) Latitude and longitude of haul

(3) Sampling procedures (for all species caught)

(a) Species for which the catch is sorted

(1) From a single net haul take four random aliquots of approximately 50 fish each. (For species with less than 200 fish in a single trawl haul accumulate samples over trawl hauls until approximately 200 fish are taken.)

(2) Measure fork length for each fish to nearest centimeter, except for herring where the measurement will be the total length to the nearest centimeter below.

(3) Where other measurement systems are used, appropriate conversion information must be supplied. Take a subsample of one fish from each centimeter interval and remove scales, otoliths, and/or statoliths, as appropriate. Record the sex of mature individuals.

(b) Species for which catch is not sorted.

(1) From a single trawl take two random aliquots of approximately 30 kilos each.

(2) Sort to individual species (for "river herring" this means sorting to alewife, Alosa pseudoharengus, and blueback, A. aestivalis; for squid, sort to Loligo and Illex).

(3) Measure fork length for each fish to nearest centimeter, except for herring where the measurement will be the total length to the nearest centimeter below. Where other measurement systems are used, appropriate conversion information must be supplied.

(4) Take a subsample of one fish from each centimeter interval and remove scales, otoliths, and/or statoliths as appropriate. Record the sex of mature individuals.

b. Length-weight samples

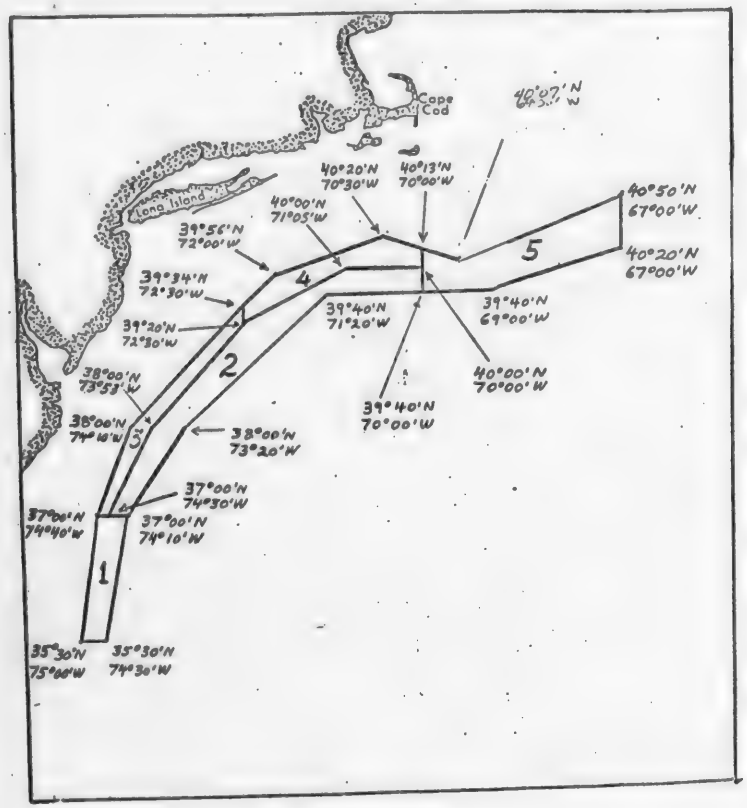
Individuals of one sample of each principal species of fish (i.e., expected yearly catch in area of agreement of 500 or more tons), per Division per month, should be weighed in grams and measured in millimeters. Each sample will contain 10 fish per centimeter interval. The length range of fish may be accumulated if necessary from small samples taken over several catches and days. With small fish, where weighing at sea of individuals is not accurate, appropriate numbers of fish of the same length class shall be weighed in aggregate. Sex shall be recorded for mature individuals.

[redacted] b. Zones and/or Periods of Limited Foreign Fishing ([redacted] and Catch Limitations ([redacted]

Loligo and Illex are abundant along the outer edge of the continental shelf throughout SA-5 and 6 during winter and summer, respectively. During the 1970's, distant-water fleets fished Loligo at the edge of the shelf from November through May, while Illex has been fished and taken as by-catch in the same area during June through October. Butterfish are the major by-catch of the squid fishery, but the data available are inadequate to identify specific areas where by-catch is less pronounced. The edge of the continental shelf, particularly to the southwest of Veatch Canyon, is also the site of the offshore lobster pot fishery during April through June. After June, lobster pots are gradually moved to shallower water (less than 150 m (80 fathoms)) from July through September and less than 100 m (about 55 fathoms) from October through December). There are few offshore lobster pot fishermen during the first 3 months of the year.

Five specific areas (windows) are proposed in which the estimated squid surplus could be harvested by foreign nationals (Figure 10). Each window is seasonal-specific and will be fished only within the dates specified (Table 35A). The areas and dates are designed to accomplish several goals: (1) minimize fishing conflicts between US and foreign vessels, (2) minimize gear conflicts (i.e. fixed lobster gear and mobile bottom trawls), (3) reduce by-catch to the extent possible, and (4) allow foreign nationals to harvest their particular allocations, if any.

FIGURE 11. Proposed squid fishing areas in which foreign nations would be allowed to harvest surplus to US needs.



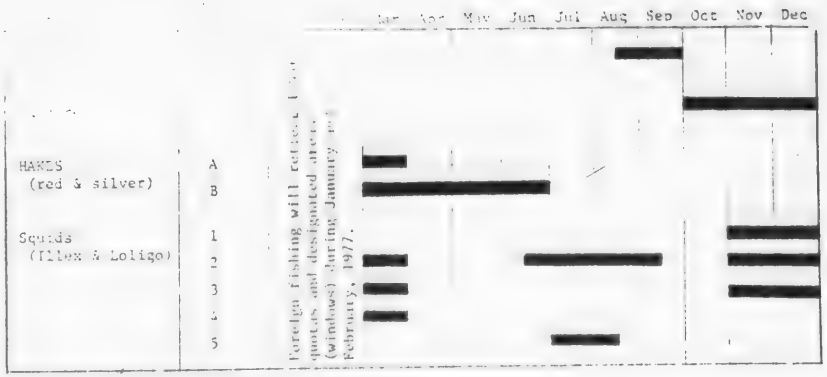


Table 27 Proposed dates during which foreign fishing is recommended for each species and window for 1977 only.

d. Other Limitations, Conditions or Requirements (303(b)(2))

1. Permits

Each foreign vessel engaged in or wishing to engage in harvesting the available surplus must obtain a permit from the Secretary of Commerce.

2. Closed season and areas

National Marine Fisheries Service shall maintain records of vessel days and catch of foreign vessels fishing for squid. Upon determination by the Director that foreign fishing vessels of a country have taken its assigned allocation of short-finned squid and long-finned squid, such determination shall be made to the appropriate agent or a government official of the country. Such notification shall be given to the foreign country not less than 48 hours prior to the closure of such fishery. Upon notification, foreign fishing vessels shall cease the directed fishing for short-finned or long-finned squid in the authorized area, and may continue to take and possess only those amounts of short-finned or long-finned squid in accordance with the incidental catch provision of Section 5.

3. Gear restrictions

It shall be unlawful for any foreign vessel fishing for short- and/or long-finned squid, under this section, to use any trawl nets having, in any part of the net, meshes of dimensions less than 60 mm (2 3/8 inches) as measured by the gauge specified below. Provided, however that solely for calendar year 1977, vessels fishing for squid that have traditionally used nets with a mesh size of less than 60 mm (2 3/8 inches) may continue to use such nets. Provided further that prior to use of such nets, the Regional Director, Northeast Region is notified of the intent to use such nets and he be allowed to inspect such nets. These mesh sizes relate to manila twine netting when measured wet after use or the equivalent thereof when measured dry before use. The Secretary may, on the basis of scientific advice as to selectivity equivalents, determine the appropriate mesh sizes when trawl nets made of materials other than manila are used or when seine nets are used.

Mesh sizes are measured by a flat wedge-shaped gauge having a taper of 2 centimeters in 8 centimeters and a thickness of 2.3 millimeters, inserted into meshes under a pressure or pull of 5 kilograms. The mesh size of a net shall be taken to be the average of the measurements of any series of twenty consecutive meshes, at least ten meshes from the lacings, and when measured in the codend of the net beginning at the after end and running parallel to the long axis.

4. Other statistical reporting requirements

(1) Operators of all fishing vessels permitted under a Governing International Fisheries Agreement to fish in the Fishery Conservation Zone (FCZ) of the United States in the Atlantic Ocean, North of Cape Hatteras shall record their catches during the permit period on a daily basis according to position, amount, date, type of gear, amount of effort, i.e., number of sets (or hooks) x time gear on the bottom (otter trawl) or fishing (midwater trawl, lines, other gear), discards, catch composition, and disposition of catch. Such vessels shall also record on a daily basis the estimated cumulative catch, including discards, by individual species, of all fish taken in the FCZ. The record shall include the disposition of the catch, while not subtracting any fish offloaded while the vessel is operating in the Fishery Conservation Zone and shall be retained aboard the vessel for the duration of the permit period.

(2) The operator of each foreign fishing vessel operating under permit in the Fishery Conservation Zone shall submit reports of fishing effort and yield through the vessel's designated agent in the United States to the Regional Director, National Marine Fisheries Service, 14 Elm Street, Gloucester, Massachusetts, 01930.

(i) A report will be submitted within 24 hours of the vessel's arrival in the Fishery Conservation Zone.

(ii) A report will be submitted weekly to indicate effort and yield Sunday through Saturday. This report should arrive at the Regional Director's office no later than Thursday of the week following the week of the report.

(iii) A report will be submitted within 24 hours of any change in directed fishery by the vessel.

(iv) A report will be submitted within 24 hours after the vessel transfers fishing operations from one window to another.

(v) A report will be submitted within 24 hours after the vessel has ceased fishing operations with intent to depart the Fishery Conservation Zone.

These reports will include vessel identification, reporting circumstances, effort (if applicable), yield (if applicable), and amount and composition of fishmeal (if applicable).

(3) The Secretary may require from time to time additional information concerning fishing operations of fishing vessels of a foreign country. Such information shall be provided in accordance with the procedures provided to the vessels or country.

5. Incidental catch

(1) The taking of herring, mackerel or butterfish is permitted as an incidental catch in the directed short-finned squid or long-finned squid fishery. The quantity of herring, mackerel, or butterfish shall not exceed the incidental catch allocation provided to the foreign country. When the allocation of herring, mackerel, or butterfish has been reached prior to reaching the allocation of short-finned or long-finned squid, fishing for short-finned or long-finned squid shall cease. Upon determination that a foreign country has caught its assigned quota of short-finned or long-finned squid, the directed fishing by that country will be closed. Subsequently incidental catch of that species shall be limited to no more than 1 percent of the total [illegible] for which the fishery has been closed.

(2) Foreign vessels fishing for short-finned or long-finned squid are limited with respect to the amount of the following species that they may have onboard: / (alewives or blueback), bluefish, striped bass, scup, sea bass, river herring squeteague, croaker, spot, and American shad. The foreign by-catch of each of the above species is limited individually to 1 percent of all other fish onboard the vessel or 2,500 kg, whichever is greater; and that the catch of all these species is limited to 7½ percent of all other fish onboard or 12,000 kg, whichever is greater.

6. Restriction

(1) Except as expressly provided for by a permit, no foreign fishing vessel shall

(i) conduct a directed fishery for any Continental Shelf Fishery resource, as such term is defined in the Fishery Conservation and Management Act of 1976 section 3(4), appertaining to the United States;

(ii) retain any such Continental Shelf fishery resource appertaining to the United States taken incidentally from the Continental Shelf; or

(iii) fail to return promptly to the sea with a minimum of injury any such Continental Shelf fishery resource.

(2) No operator of any foreign fishing vessel shall conduct any fishing within 12 nautical miles of the baseline used to measure the Territorial Sea of the United States unless expressly authorized by a permit.

7. Fixed gear avoidance

All foreign fishing vessels are prohibited from fishing between the 100-200 fathom depths on the Continental Shelf in the Atlantic north of Cape Hatteras within authorized fishing zones.

Fishing is prohibited in areas of reported fixed gear outside of the 100-200 fathom lines. The operator of each foreign vessel operating

in an authorized fishing zone shall exercise caution when fishing within 2 nautical miles of such reported gear areas.

Locations of fixed gear in geographic coordinated (latitude and longitude) are broadest on the first day of each month by Coast Guard Communications Station Boston (NMF) on 472 KHZ at 1350 GMT in radiotelgraphy. These summary lists are updated each day at 1350 GMT, with a broadcast on the same frequency listing changes in fixed fishing gear locations reported by fishermen. Additionally, voice broadcasts in English are made each day by NMF on 2670 KHZ at 1405 GMT and by Coast Guard Communications Station Portsmouth (NMN) on 2670 KHZ at 1350 GMT and by the Boston Marine Operator Radio Green Harbor, and Norfolk Marine Operator after their scheduled Marine Information broadcasts. The voice broadcasts list the locations of the fixed gear in LORAN A coordinates. Both the radiotelegraphy and voice broadcasts are numbered sequentially by month, day, and year. A printed monthly summary of fixed gear information is available by contacting: COMMANDER (Aol), U.S. Coast Guard, Atlantic Area, Governors Island, New York, NY, 10004; Telephone: (212) 264-0644 or (212) 264-0645. All operators of foreign fishing vessels shall copy such daily fixed gear broadcasts and shall maintain on the bridge of such vessel a chart showing the current location of fixed gear in areas where it will be fishing.

8. Sanctions

If any foreign fishing vessel, for which a permit has been issued, fails to pay any civil or criminal monetary penalty imposed pursuant to the Act, the Secretary shall:

(a) revoke such permit, with or without prejudice to the right of the foreign nation involved to obtain a permit for such vessel in any subsequent year;

(b) suspend such permit for the period of time deemed appropriate; or

(c) impose additional conditions and restrictions on the approved application of the foreign nation involved and on any permit issued under such application.

Provided however that any permit which is suspended pursuant to this paragraph for nonpayment of a civil penalty shall be reinstated by the Secretary upon the payment of such civil penalty together with interest thereon at the prevailing rate.

e. Coastal State Fishery Conservation and Management Measures Recommended for Incorporation into this Plan

N/A

f. Other Measures

N/A

g. Relationship of Conservation and Management Measures to Conservation Needs

The proposed management plan contains catch restrictions deemed necessary to meet the conservation requirements of Illex and Loligo in SA 5 and 6. A total allowable surplus catch limitation, based on the best scientific evidence presently available, has been incorporated to prevent the possible overexploitation of squid and promote the orderly development of the fishery, recognizing that review and readjustments of the OY's may be necessary when additional data are available for analysis. An additional important consideration of the plan is the inclusion of data collection

requirements, which will provide vital data (presently a limiting factor) to update and refine assessment models required to establish more precise OY limitations. Another essential requirement also limits foreign fishing activity spatially and temporally to minimize conflicts between the offshore lobster pot fishery and the foreign squid fishery in SA 5 and 6.

h. Relationship of Conservation and Management Measures to National Standards (20(g)(4)(b)

The proposed conservation and management measures for squid subscribe to the national standards of the Fishery and Conservation Management Act of 1976. Since the best scientific information available indicates that neither Loligo nor Illex can be separated into any distinguishable stocks, both species were treated as a single stock. Also, since the total availability minus US capacity is designed to insure optimum sustainable yield, no long-term overfishing of the species is expected.

Opening the fishing seasons during winter and summer accounts for the for the variation in the seasonality of the fisheries for the two species. The area regulations that accompany the seasonal regulations are designed to minimize losses of gear in the lobster pot fisheries.

No quotas have been recommended for the individual states within the USA, thus no state-based discriminatory policies are being incorporated into the plan. The efficient utilization of the resource is being fostered, by opening the seasons at those times when the catch per unit of effort is best. In addition, the OY of Illex is high enough that it might encourage a shirting of vessels from other less productive fisheries or from those fisheries in which the TAC has been reached, to the Illex fishery.

i. Approximate Costs of Conservation and Management Measures (201(g)(2))

N/A

VI. References to Relevant Background Document

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